Linear and Non-Linear Effects of Fiscal Deficit on Inflation in Pakistan: A Test of the Fiscal Theory of the Price Level

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Abstract

The study conducts an empirical analysis of the asymmetric short-run and long-run effects of fiscal deficits on inflation in Pakistan within the framework of the Fiscal Theory of the Price Level (FTPL). The study uses annual time-series data for the period 1960-2024 and employs linear auto-regressive distributed lag (ARDL) and nonlinear ARDL (NARDL) models to estimate the fiscal deficit–inflation nexus, capturing dynamic and asymmetric adjustments. Inflation is the dependent variable, while fiscal balance, exchange rate, unemployment rate, current account balance, interest rate, debt-to-GDP ratio, oil price, trade deficit, and broad money supply are chosen as independent variables representing fiscal and monetary variables. When the fiscal deficit is high, inflation will happen. So, the proposition of the FTPL holds true. A rise in the exchange rate and the oil price further augments inflation, while fiscal discipline, efficient debt management, and proper interest rate policy help stabilise prices. The findings highlight that persistent fiscal imbalances, compounded by external shocks, weaken the effectiveness of monetary policy.

Keywords: Fiscal Deficit, Inflation, Exchange Rate, NARDL.

Introduction

In the early 21st century, researchers thoroughly examined the role of fiscal policy in achieving internal and external equilibrium simultaneously. We can say that Pakistan's slow economy, above-average inflation, and rising fiscal and trade deficits have put the country at risk of default. The current study focuses on this question. Currently, the economy is under huge pressure. This pressure is visible in large budget deficits and continuous current account deficits on both the fiscal and external fronts. Our public debt is so high that a large share of the federal budget is devoted to servicing it. Foreign exchange reserves are critically low. Government data shows that over the last five years, Pakistan's economy has expanded at a rate of 2.6 per cent. The growth rate was lower than the target growth rate of 3.5 per cent. Furthermore, the growth was consumption-based. The unregulated and inefficient spending, coupled with weak revenue growth, stagnant exports and rising imports, has exacerbated the twin-deficit problem and heightened inflationary pressures in the country. The economy grew by only 2.7 per cent in FY 2024-2025, against the target of 3.0 per cent. In the same financial year, the saving-investment gap was at 0.3 per cent of GDP, with total investment at 13.8 per cent and national savings at 14.1 per cent. Over the last five years, the fiscal deficit has averaged 6.82 per cent of GDP. Total revenue stood at 12.86 per cent. On the contrary, total expenditure

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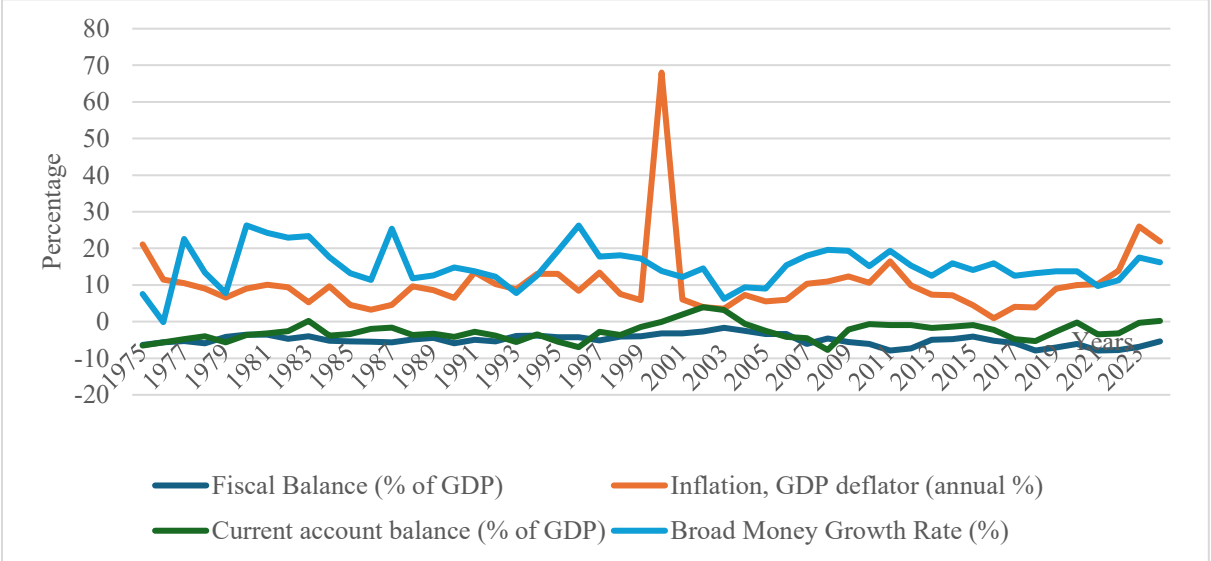
stood at 19.68 per cent. Over the last five years, inflation as measured by the GDP deflator was 16.4 per cent. The current account deficit stood at 3.5 per cent of GDP in 2021. In 2020 and 2022, the continuous rise in the budget deficit exerted intense pressure on aggregate demand, further deteriorating inflationary conditions in the country (Government of Pakistan, 2018-19). An examination of the tax structure over the last five decades reveals significant changes in Pakistan's revenue composition. The trend is shifting from indirect to direct taxes over the years. Due to political troubles, mishandled funds, repeated flooding and rebellious activity, we had little money left over to prepare. Often, this kind of situation produces domestic inflationary pressures, suggesting that more research on this point is necessary. According to the GDP deflator, the target inflation rate averaged 9.90 per cent between 2013 and 2024. In FY 2024, inflation stood at 21.8 per cent, with end-period rates of 21.8 per cent and 25.9 per cent in FY 2023. Domestic inflation has been driven mainly by non-food items, which rose by 5.4 per cent (Government of Pakistan, 2018-19). An overview of annual inflation based on the GDP deflator, money supply growth, current account balance, and primary fiscal balance for the sample period is shown in Figure 1. The depiction shows a clearer link between inflation, current account balance and the primary fiscal balance. Further, money supply growth seems to show no substantial relationship with inflation trends.

In recent years, Pakistan's emphasis on fiscal consolidation has resulted in measures on both the revenue and expenditure sides to bring down the overall fiscal deficit to a sustainable level. In this case, the law on fiscal liability and limitation of the debt was passed in 2005 in order to ensure the sustainability of public finances. Internal insurgencies, the global financial turmoil of 2007-08 and the devastating flood of 2010, put a heavy strain on the national exchequer. Despite many challenges, fiscal consolidation measures, including tighter control of public expenditure, increased revenue generation as well as modification of subsidies, narrowed the budget from 1.7 percent of GDP in FY2013 to 5.3 per cent in FY2018. During the same time, total expenditure came down from 18 percent of GDP to 19.1 percent, whereas total revenue increased from 13.6 percent to 15.7 percent of GDP (Government of Pakistan, 2024-25). Due to the austerity measures, the domestic inflation rate dropped from 25.9 percent to 21.8 percent as shown in Figure 1.

Figure 1: Trends of Macroeconomic Variables of Pakistan



Price stability has historically been one of the most important public policy objectives (Christiano & Fitzgerald, 2000). Nonetheless, there is a dearth of studies from Pakistan that

examine FTPL and its connection with MTPL which is important for identifying an effective stabilization strategy. In several developing countries, including Pakistan, where fiscal activism is high, scholars often blame expansionary monetary policy and currency depreciation for internal inflationary pressures. Hussain et al. (2020), Chaudhry et al. (2015), Chaudhry et al. (2012) and Khalid (2005) conduct research in Pakistan on domestic inflation. They link domestic inflation not only to monetary policy expansion and exchange rate depreciation but also to fiscal deficits and other external influences. Under conditions in which the central bank aims to target inflation and there is fiscal activism, then it seems that fiscal policy has a direct impact on monetary policy and an indirect impact on inflation.

Farmer and Zabczyk (2019) state that FTPL will not identify a unique price level. Thus, they claim that FTPL lacks applicability in the overlapping generation model case. On the contrary, Kemal (2006) and Qayyum (2006) identify monetary expansion as the most important cause of domestic inflation in Pakistan. Moreover, Khan and Schimmelpfenning (2006) mention that for Pakistan, besides money supply, structural bottlenecks also cause inflationary pressures. Some studies that failed to establish a causal link between fiscal deficits and inflation for Pakistan and other countries mostly resulted from the use of inappropriate estimation techniques and the omission of fiscal policy variables from their empirical models. Similarly, when studies focus on domestic inflation and primarily take monetary policy into account, the use of overall fiscal balance may distort the findings. Using the unadjusted fiscal balance without considering the business cycles can yield outcomes which are inconsistent with the existing propositions of the FTPL. Another limitation is the assumption of symmetry, which assumes that expansionary and contractionary fiscal policies affect the economy equally.

In many developing economies, the mandate of monetary policy is to create stable growth via inflation targeting. This has not always been successful. Several emerging economies have had their own experiences, as in the early 1990s, Brazil and Turkey experienced price rises. Indonesia and the Philippines underwent the same experience in 2008 that price increases are not contained by inflation targeting and tighter monetary policy Tran (2018). According to Mishkin (2004), these failures can often be attributed to constant fiscal deficits and a fiscal dominance that impairs the capacity of monetary policy to curb inflation. So, it is harder to target inflation in countries with low price credibility, weak institutions and unsustainable fiscal position (Eichengreen, 2002). Pakistan struggles with low-price credibility, problems in institutions, corruption and fiscal unsustainability. In this situation, the central bank's task through monetary policy should not be inflation targeting.

Similarly, various empirical studies in Pakistan have some serious limitations. Many studies take it for granted that there is a linear relationship between fiscal policy and domestic inflation. This assumption seems to be a bit too restrictive, as the impact may in reality be asymmetric. What this means is that a rise in the fiscal deficit can push up the general price level. However, a decline will not lower it. Another issue is that quite a few of the studies use a proxy of either government expenditure or overall fiscal deficit for fiscal policy. The research literature on Pakistan provides only simple assessments of the FTPL impact, which do not show a holistic picture. Re-examining whether or not fiscal deficits have asymmetric effects on inflation, at least empirically, may be worth our while. Moreover, the FTPL may also be of practical importance in developing economies, which typically issue debt in domestic currency, do not have sufficient revenue and are highly sensitive to capital flows (Beck-Fris and Willems, 2017). In Pakistan, the fiscal policy has taken a more dominant role, resulting in the inactive position of monetary policy.

Literature Review

Table 1 summarizes prior empirical studies on the fiscal deficit–inflation nexus, highlighting key findings.

Table 1: Summary of Empirical Studies on Fiscal Deficit and Inflation

Author(s)	Country / Region	Time Period	Methodology	Main Findings
Godwin Mfon and Udoma (2025)	Nigeria	1981–2024	ADF & PP tests; ARDL Model	Fiscal deficit has positive but insignificant long-run effect on inflation; policy discipline recommended.
Tariq et al. (2025)	India	1971–2020	STAR Model; Toda–Yamamoto Causality	Inflation rises once fiscal deficit exceeds 3.40% threshold; fiscal deficit Granger-causes inflation.
Ooft (2025)	Suriname	1961–2022	Structural VAR (SVAR)	Inflation mainly driven by exchange rate and energy prices; fiscal shocks affect inflation indirectly.
Oyasor (2025)	Nigeria	1986–2021	ARDL Model	Money supply and interest rates drive inflation; weak fiscal–monetary coordination increases volatility.
Obeng & Abotsi (2024)	Ghana	1976–2019	ARDL + VECM	Fiscal deficit positively affects inflation in short and long run; unidirectional causality from inflation to deficit.
Momodu et al. (2024)	Nigeria	1981–2022	ADF + ARDL	Infrastructure spending increases inflation; deficits insignificant long-run effect; mixed short-run effects.
De Alwis et al. (2023)	Sri Lanka	1977–2019	ARDL Model	Fiscal deficit has positive & significant effect on inflation in both short and long run.
Banerjee et al. (2022)	Advanced Economies (21 Countries)	40 Years	Open-Economy Phillips Curve + Inflation-at-Risk Framework	Fiscal deficits cause stronger inflation under fiscal dominance than under monetary discipline.
Nguyen et al. (2022)	Vietnam	1997–2020	VAR Model	Inflation increases with fiscal deficit, money supply, government spending and interest rate.
Osei and Ogunkola (2022)	Ghana	1980–2018	Markov-Switching Regime Model (MSRDM)	Inflation impact stronger in high-deficit regimes; consolidation needed to maintain price stability.
Duodu et al. (2022)	Ghana	1999Q1–2019Q4	VECM + Granger Causality	Budget deficits increase inflation; money supply has negative effect; supports fiscal theory of price level.
Kaur (2022)	India and China	1985–2017	VAR + VECM + IRF	Fiscal deficits inflationary in India but not China;

				structural factors dominate inflation in China.
Khieu (2021)	Vietnam	1995–2012	SVAR Model	Money growth causes inflation; budget deficit has no significant effect.
Osei (2021)	Ghana	1980–2018	NARDL Model	Fiscal deficit financing has asymmetric effects on inflation; fiscal consolidation lowers inflation.
Agoba (2021)	48 African Countries	1970–2012	Two-Stage System GMM	Fiscal deficits inflationary but weakened by central bank independence and strong institutions.
Eita et al. (2021)	Namibia	2002–2017	ARDL + Granger Causality	Fiscal deficit increases inflation; South Africa's inflation also transmits to Namibia.
Vishal and Ashok (2021)	India	1980–2017	ARDL + NARDL	No linear link, but significant nonlinear long-run deficit–inflation relationship.
Win (2017)	Myanmar	1988–2015	Engle–Granger Cointegration + ECM	Fiscal deficits and inflation reinforce each other; bidirectional causality exists.

The reviewed literature shows that the relationship between fiscal deficit and inflation has been widely studied across different countries, producing mixed and context-specific results. In many developing and emerging economies, fiscal deficits have been found to exert inflationary pressures, particularly when financed through money creation or when fiscal institutions are weak. However, some studies find weak or insignificant relationships where deficits are financed through borrowing or where monetary institutions are more independent. Evidence also points to the presence of bidirectional causality in certain contexts, suggesting that fiscal deficits can fuel inflation, but inflationary pressures can equally contribute to higher fiscal imbalances.

Moreover, several studies highlight that the effects of fiscal deficits on inflation are not uniform. The relationship varies across countries and periods and in some cases, it is nonlinear, with inflationary effects intensifying once fiscal deficits cross certain thresholds. Others point to country-specific financing structures and economic environments as key determinants of whether fiscal deficits translate into higher prices. This underscores the fact that the fiscal deficit–inflation nexus is complex, dynamic and dependent on institutional and structural factors.

Despite the growing body of literature on inflation dynamics in Pakistan, significant gaps remain in understanding the fiscal determinants of price stability. Much of the existing research has relied on linear models, assuming symmetric effects of fiscal policy on inflation, which oversimplifies the complex interactions between fiscal deficits and price levels. Many studies have used either government spending or government overall fiscal balance as a proxy for fiscal policy. This is another misrepresentation, ignoring the importance of primary fiscal balance and possibility asymmetries. Due to the methodological flaws, a number of studies failed to capture the nature of the inflationary impact of the fiscal policy.

Another gap lies in the empirical approaches adopted. Numerous studies have used estimation techniques focusing on either nonlinearity or dynamic interactions, the results of which remain inconclusive or contradictory. Furthermore, most literature has focused on monetary policy as the principal tool to control inflation, while the timing role of fiscal policy also under fiscal dominance, is not explored. It is particularly important in Pakistan because prolonged fiscal deficits, weak institutions, volatility of the exchange rate and external shocks have increasingly limited the efficacy of monetary policy. A robust and dynamic model that captures the asymmetric effects of the fiscal deficit on inflation is essential at this time. To address this gap, the present study employs advanced econometric techniques, namely the NARDL and augmented ARDL models, to explore the fiscal-monetary-inflation nexus in Pakistan.

Model Specification, Data and Methodology

To test the Fiscal Theory of the Price Level (FTPL), this study investigates the effect of fiscal deficit on inflation in Pakistan using Hussain et al (2020). The balance between the government's fiscal deficit (spending minus revenues) that's expected to be financed through issuing new money (M) and the stability in the price level. This aim will be achieved through an econometric model where inflation, as expressed by the GDP deflator, is the dependent variable, whereas several macroeconomic variables serve as independent variables.

The reason inflationary pressures happen is because of the persistent no-funding fiscal deficit. Furthermore, they argue that increasing fiscal miters money, which generates an implicit inflation tax. Along with the main variable, the model also incorporates various control variables that are based on the theory of inflation. The Phillips Curve highlights the relationship between inflation and unemployment. As a result, an inverse relationship in unemployment occurs. When there is a current account deficit in an economy, the import and export of goods and services must be unequal. The ratio of debt to GDP is said to capture demand-pull inflation since higher debt tends to increase demand, which generally raises prices. In light of the depreciation of domestic currency, it is included in the model to measure its effect on domestic inflation through imported goods and services. Interest rates are included in the model as a monetary policy. Higher interest rates are expected to control inflation, whereas lower interest rates will increase demand. Oil prices are incorporated to reflect cost-push inflation, since an increase in international oil prices raises production and transportation costs. The trade deficit is considered on the basis of structuralist theory, as persistent reliance on imports may transmit inflationary pressures to the domestic economy. Finally, broad money (M2) serves as a proxy for money supply and is included under the Quantity Theory of Money, which links excessive monetary expansion to inflation. The functional form of the model is given as:

$$INF_t = f(FD_t, UNEMP_t, CAD_t, DEBTGDP_t, EXR_t, INT_t, OIL_t, TD_t, M2_t) \quad (1)$$

Based on these considerations, the baseline econometric model can be expressed as:

$$INF_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 UNEMP_t + \alpha_3 CAD_t + \alpha_4 DEBTGDP_t + \alpha_5 EXR_t + \alpha_6 INT_t + \alpha_7 OIL_t + \alpha_8 TD_t + \alpha_9 M2_t + \varepsilon_t \quad (2)$$

The study used the time series data of Pakistan covering the period from 1960 to 2024. Table 2 shows the description of the variables, unit of measurement as well as source of data collection.

Table 2: Variables Descriptions, Measurement Unit and Data Sources

Variables	Description	Unit of Measurement	Data Source
INF	Inflation	annual %	WDI
FD	Fiscal Balance	% of GDP	Pakistan Economy Database
UNEMP	Unemployment	% of total labor force) (modeled ILO estimate	WDI
CAD	Current Account Balance	% of GDP	WDI
DEBTGDP	External Debt-to-GDP Ratio	% of GDP	IDS
EXR	Exchange Rate	LCU per US$, period average	WDI
INT	Lending Interest Rate	%	WDI
OIL	Oil Price	US PKR per barrel	InflationData.com
TD	Trade Deficit	% of GDP	Pakistan Economy Database
M2	Broad Money (M2)	% of GDP	WDI

To begin the empirical analysis, the time series properties of the variables must be examined in order to avoid spurious regression results. For this purpose, the study applies two widely used unit root tests: the Dicky-Fuller Generalized Least Square (DF-GLS or ERS) test and the Phillips-Perron (PP) test. Since many authors, including Harris (1992, 2009); Elliot et al. (1996), have argued that the conventional ADF test performs poorly in small sample studies, this study employs the DF-GLS (ERS) test as a preferred alternative. Both tests are conducted under two specifications: with drift and without drift to ensure robustness of the results.

The DF-GLS, proposed by Elliot et al. (1996), is a modified version of the Augmented Dickey-Fuller (ADF) test that improves efficiency by detrending the series using Generalized Least Squares before running the regression. The general form of the DF-GLS regression is given as:

$$\Delta y_t = \alpha y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \varepsilon_t \quad (3)$$

Where yt is the series being tested, Δ is the first difference operator, p is the chosen lag length and ε_t is the error term. The null hypothesis $(H_0 : \alpha = 0)$ indicates the presence of a unit root (non-stationarity), while the alternative hypothesis $(H_1 : \alpha < 0)$ suggests stationarity. The test is performed both with drift, where a constant term is included and without drift, where no constant or trend is included, depending on the underlying properties of the series.

The Phillips-Perron (PP) test, introduced by Phillips and Perron (1988), extends the basic Dickey-Fuller approach by making non-parametric corrections for serial correlation and heteroskedasticity in the residuals. The test regression can be written as:

$$\Delta y_t = \gamma y_{t-1} + \mu_t \quad (4)$$

Where μ_t is the error term. The PP test statistics is adjusted using consistent estimates of long-run variance of μ_t. Similar to the DF-GLS test, the null hypothesis $(H_0 : \gamma = 0)$ assumes a unit root, while the alternative $(H_1 : \gamma < 0)$ suggests stationarity. The PP test is likewise estimated with and without drift.

Secondly, the study applies the Bounds F-test within the ARDL framework to examine the long-run cointegration relationship between inflation and its determinants under the Fiscal Theory of the Price Level (FTPL). The bounds testing approach, developed by Pesaran et al. (2001), is particularly suitable because it can be applied regardless of whether the regressors

are integrated of order zero, I(0) or order one, I(1), but not of order two, I(2). This flexibility makes it appropriate for macroeconomic data that typically exhibit mixed integration orders.
The unrestricted error correction version of the ARDL model can be expressed as:

$$\Delta INF_t = \alpha_0 + \sum_{i=1}^{p} \phi_i \Delta INF_{t-i} + \sum_{j=1}^{k} \sum_{m=0}^{q_i} \beta_{jm} \Delta X_{jt-m} + \lambda_1 INF_{t-1} + \sum_{j=1}^{k} \lambda_{2j} X_{j,t-1} + \varepsilon_t \quad (5)$$

The null hypothesis is that no long-run relationship exist $\lambda_1 = \lambda_{2j} = 0$, while the alternative hypothesis suggests the presence of cointegration. The computed F-statistics from the bounds test is compared with two sets of critical values provided by Pesaran et al. (2001): one assuming all variables are I(0) and the other assuming that all variables are I(1). If the F-statistic exceeds the upper bound critical value, the null hypothesis of no cointegration is rejected, indicating a long-run relationship among the variables consistent with the FTPL. If the F-statistic falls below the lower bound, the null hypothesis cannot be rejected. If the statistic lies between the bounds, the result is inconclusive.
After conducting the bounds F-test, the analysis must also consider the possibility of degenerate cases. Pesaran et al. (2001) note that rejecting or failing to reject the null hypothesis of no cointegration may sometimes lead to misleading conclusions if the model falls into a degenerate form. Therefore, this study applies the degenerate-dependent and degenerate-independent tests to ensure the validity of the FTPL model.
In the Degenerate-Dependent Case, the null hypothesis tests whether the lagged level of the dependent variable is insignificant in the error correction form, while the lagged levels of the independent variables are significant. Formally, the null hypothesis is:

$$H_0 : \lambda_1 = 0 \ and \ \lambda_{2j} \neq 0 \quad (6)$$

If this case holds, it implies that the dependent variable is not influenced by its own past levels, but only by the levels of the explanatory variables. Such a situation would suggest that the standard ARDL bounds test could give a spurious indication of cointegration.
In contrast, the Degenerate-Independent Case arises when the lagged level of the dependent variable is significant, but the lagged levels of the independent variables are insignificant. Formally, the null hypothesis is:

$$H_0 : \lambda_1 \neq 0 \ and \ \lambda_{2j} = 0 \quad (7)$$

This case indicates that the dependent variable adjusts only to its own past values and not to the independent variables, which again would imply that the bounds F-test does not provide valid evidence of cointegration. By testing for these degenerate cases, the study ensures that the bounds results are not misinterpreted. If neither degenerate-dependent nor degenerate-independent cases are present, then a valid long-run relationship between dependent and independent variables can be established.
Once cointegration is established, the study further examines the weak exogeneity of the explanatory variables in the NARDL framework. The weak exogeneity test assesses whether the regressor can be treated as exogenous with respect to the long-run parameters. If a variable is weakly exogenous, it means that while it influences the dependent variable, it does not adjust in response to disequilibrium in the long-run relationship.
The test is conducted using the Likelihood Ratio (LR) test, which is based on comparing the restricted and unrestricted models. The test statistic is given as:

$$Lr = -2(\ln L_r - \ln L_u) \quad (8)$$

Where $\ln L_r$ is the log-likelihood of the restricted model and $\ln L_u$ is the log-likelihood of the unrestricted model. The test statistic follows a chi-square distribution with degrees of freedom equal to the number of restrictions imposed.
The null hypothesis for the test represents an instance where the variable in question is weakly exogenous, while the alternative hypothesis represents the case in which it is endogenous. If

the LR statistic is not statistically significant, the null hypothesis cannot be rejected and the variable is weakly exogenous. If the LR statistic is significant, however, the null hypothesis is rejected, meaning that the variable does adjust to disequilibrium and thus cannot be considered weakly exogenous.

After the establishment of cointegration, the study goes on to estimate the long-run coefficients of the models through Linear ARDL (LARDL) and Nonlinear ARDL (NARDL). The coefficients of lagged level variables are estimated in the model, which helps to find the long-run relationships of inflation and its determinants. The general form of the ARDL model is:

$$INF_t = \alpha_0 + \sum_{i=1}^{p} \phi_i \Delta INF_{t-i} + \sum_{j=1}^{k} \sum_{m=0}^{q_i} \beta_{jm} \Delta X_{jt-m} + \varepsilon_t \quad (9)$$

From this specification, the long-run coefficient of the j[th] explanatory variable is obtained as:

$$\theta_j = \frac{\sum_{m=0}^{q_i} \beta_{jm}}{1 - \sum_{i=1}^{p} \phi_i} \quad (10)$$

The long-run elasticity of inflation with respect to variable Xj is measured by θ_j. These estimates show what will happen to inflation if the fiscal deficit and other macroeconomic factors change for the long run.

The NARDL model decomposes the fiscal deficit variable into its positive and negative partial sums, allowing for the capture of potential asymmetric effects. The coefficients in the long run are for the positive and negative components.

$$\theta^+_j = \frac{\sum_{m=0}^{q_i} \beta^+_{jm}}{1 - \sum_{i=1}^{p} \phi_i}, \qquad \theta^-_j = \frac{\sum_{m=0}^{q_i} \beta^-_{jm}}{1 - \sum_{i=1}^{p} \phi_i} \quad (11)$$

θ^+ represents the long-run impact of an increase in the fiscal deficit on inflation, while θ^- represents the long-run impact of a decrease in the fiscal deficit. By comparing these coefficients, the NARDL model allows us to determine whether the effects of fiscal expansion and fiscal contractions on inflation are symmetric or asymmetric.

Once the presence of cointegration is suggested by the bounds F-test, the Error Correction Model (ECM) t-bounds test is applied to validate the long-run relationship. Unlike the F-test, which jointly tests the significance of the lagged level of the dependent and independent variables, the ECM t-test focuses on the significance of the error correction term (ECT). The unrestricted error correction representation of the ARDL model is specified as:

$$\Delta INF_t = \alpha_0 + \sum_{i=1}^{p} \phi_i \Delta INF_{t-i} + \sum_{j=1}^{k} \sum_{m=0}^{q_i} \beta_{jm} \Delta X_{jt-m} + \varphi ECT_{t-1} + \varepsilon_t \quad (12)$$

Where ECT_{t-1} is the lagged error correction term that measures deviations from the long-run equilibrium. The null and alternative hypotheses of the ECM t-test are:

$$H_0 : \varphi = 0 \quad (No\ long-run\ adjustment)$$
$$H_1 : \varphi < 0 \quad (Valid\ long-run\ adjustment) \quad (13)$$

If the estimated t-statistic of the error term correction coefficient is more negative than the lower bound critical value, the null hypothesis is rejected, confirming the presence of a stable long-run relationship. If the statistic is less negative than the upper bound, the null cannot be rejected. When the statistic falls between the two bounds, the result is inconclusive.

Finally, the study tests the impact of asymmetry of fiscal deficit on inflation within the NARDL framework using the Wald/F-test. If the Wald/F-test exceeds the upper bound (I(1)), asymmetry is confirmed, if it is below the lower bound (I(0)), symmetry is holds and if it lies between the bounds, the result is inconclusive.

Results and Discussion

Table 3 shows the descriptive statistics for ten key macroeconomic variables, namely inflation (GDP deflator), fiscal balance, unemployment, current account balance, debt-to-GDP ratio, exchange rate, lending interest rate, nominal oil price, trade deficit and broad money. The mean inflation rate (INF) is 9.47 percent, suggesting a moderate level of inflation on average, while the median value of 8.16 percent indicates that most years experienced inflation around this rate. However, the maximum inflation of 68.01 percent and a minimum of -1.15 percent highlight periods of extreme price instability. The standard deviation of 9.24 reveals significant variability and the skewness value of 4.22 indicates a strong right-skewed distribution with several years of abnormally high inflation. The kurtosis value of 26.58 further suggests the presence of heavy tails and sharp peaks. The Jarque-Bera statistic (1672.76) and probability of 0.000 confirm non-normality, implying that inflation rates have fluctuated abnormally over the period.

The fiscal balance (FD) exhibits a mean of -5.04 percent, suggesting a consistent fiscal deficit trend, with a median of -5.05 percent reinforcing this result. The minimum and maximum values of -7.9 and -1.7 percent indicate persistent deficits but limited fiscal improvement. The standard deviation of 1.45 shows moderate dispersion, while skewness (-0.162) suggests near symmetry. A kurtosis value of 2.72 indicates a nearly normal distribution and the Jarque-Bera value (0.386) with a probability of 0.825 confirms normality, implying stable fiscal patterns.

The unemployment rate (UMEMP) has a mean of 1.99 percent and a median of 0.64 percent, implying low unemployment on average. The maximum value of 6.34 percent indicates economic downturns, while the minimum of 0.40 percent reflects periods of high employment. The standard deviation of 2.00 shows moderate variability. The skewness of 0.997 indicates a right-skewed distribution, meaning some years experienced higher unemployment and the kurtosis value of 2.42 suggests a flatter distribution. The Jarque-Bera statistic (6.11) and probability of 0.047 indicate mild non-normality, reflecting occasional irregularities in unemployment trends.

The current account balance (CAD) shows an average deficit of -2.63 percent of GDP, with a median of -2.78 percent, confirming persistent external imbalances. The maximum value (3.94 percent) represents temporary surpluses, while the minimum (-7.74 percent) indicates deep external deficits. The standard deviation (2.37) shows noticeable fluctuations, while the skewness (0.49) suggests a slight right skew. The kurtosis (3.51) implies a near-normal distribution and the Jarque-Bera statistic (2.49) with a probability of 0.288 indicates no significant departure from normality.

The debt-to-GDP ratio (DEBTGDP) has a mean of 2.15 and a median of 1.32, reflecting variations in debt levels relative to GDP. The maximum value (7.47) suggests sharp increases in debt during certain periods, whereas the minimum (0.16) shows periods of lower debt levels. The standard deviation (2.18) demonstrates high variability, while skewness (1.03) suggests right-skewed data due to occasional debt surges. The kurtosis (2.97) indicates a near-normal distribution and the Jarque-Bera statistic (9.54) with a probability of 0.008 rejects normality, showing that extreme values influenced the debt levels.

The exchange rate (EXR) records a mean of 52.00, with a median of 25.08, suggesting that the domestic currency depreciated over time. The maximum rate (280.36) and minimum (4.76) highlight significant fluctuations and episodes of currency devaluation. The standard deviation (61.72) reveals high volatility, while skewness (1.97) shows a strong right-skew, indicating rapid depreciation periods. The kurtosis (7.07) denotes a peaked distribution with fat tails. The Jarque-Bera statistic (86.88) and probability (0.000) confirm non-normality, suggesting instability in the exchange rate.

The lending interest rate (INT) has an average of 11.09 percent and a median of 11.36 percent, indicating consistency in borrowing costs. The range between a maximum of 14.54 percent and

a minimum of 7.26 percent suggests moderate policy shifts. The standard deviation (2.30) indicates limited variability, while skewness (-0.03) implies symmetry. The kurtosis (1.78) shows a relatively flat distribution and the Jarque-Bera value (1.12) with a probability of 0.571 indicates normality, reflecting a stable monetary policy environment.

Table 3: Key Statistics of Variables used in the Study

	INF	FD	UMEMP	CAD	DEBTGDP	EXR	INT	OIL	TD	M2
Mean	9.466	-5.040	1.999	-2.633	2.151	52.003	11.087	1832.590	-4.431	43.051
Median	8.157	-5.050	0.640	-2.776	1.324	25.083	11.359	470.800	-5.000	43.490
Maximum	68.010	-1.700	6.338	3.936	7.473	280.356	14.538	9265.510	10.400	54.526
Minimum	-1.149	-7.900	0.398	-7.742	0.156	4.762	7.258	13.570	-10.500	28.690
Std. Dev.	9.236	1.449	2.005	2.372	2.176	61.722	2.300	2637.266	4.123	5.333
Skewness	4.220	-0.162	0.997	0.490	1.029	1.971	-0.025	1.467	1.390	-0.399
Kurtosis	26.581	2.717	2.420	3.511	2.970	7.067	1.778	3.822	5.821	3.017
Jarque-Bera	1672.761	0.386	6.108	2.490	9.536	86.876	1.122	23.604	35.301	1.729
Probability	0.000	0.825	0.047	0.288	0.008	0.000	0.571	0.000	0.000	0.421

The nominal oil price (OIL) averages 1832.59 PKR per barrel, with a median of 470.80 PKR, showing a dramatic increase over time. The maximum value (9265.51 PKR) demonstrates the effect of global oil price shocks and currency depreciation, while the minimum (13.57 PKR) reflects earlier low-price periods. The standard deviation (2637.27) indicates extreme volatility. Skewness (1.47) and kurtosis (3.82) suggest a right-skewed and leptokurtic distribution, confirming price instability. The Jarque-Bera statistic (23.60) with a probability of 0.000 rejects normality, consistent with the highly volatile nature of oil prices.

The trade deficit (TD) averages -4.43 percent of GDP, indicating persistent trade imbalances. The median value (-5.00 percent) supports this trend. The maximum (10.40 percent) indicates rare surpluses, while the minimum (-10.50 percent) shows severe deficits. The standard deviation (4.12) reveals substantial fluctuations and skewness (1.39) indicates a right-skewed distribution due to occasional improvements in trade. The kurtosis (5.82) reflects a peaked distribution and the Jarque-Bera statistic (35.30) with a probability of 0.000 rejects normality, highlighting strong volatility in external trade.

Broad money (M2) shows a mean of 43.05 percent of GDP and a median of 43.49 percent, indicating relative consistency in monetary expansion. The maximum (54.53 percent) and minimum (28.69 percent) show limited variability over time. The standard deviation (5.33) supports this stability, while skewness (-0.40) implies a slight left skew. The kurtosis (3.02) indicates a near-normal distribution and the Jarque-Bera value (1.73) with a probability of 0.421 confirms normality. This stability suggests that monetary growth was predictable and steady throughout the period.

Overall, the results show that inflation, exchange rate, oil prices and trade deficit display high volatility and non-normal distributions, reflecting macroeconomic instability. In contrast, fiscal balance, interest rate and broad money exhibit relatively stable and near-normal trends. Persistent fiscal and current account deficits highlight structural weaknesses, while fluctuations in the exchange rate and oil prices suggest external vulnerability to global shocks.

The results of the correlation analysis are presented in Table 4. The findings indicate that inflation has a weak positive correlation with the current account balance, debt-to-GDP ratio, oil prices and trade deficit, while showing a weak negative correlation with fiscal balance, unemployment, exchange rate and broad money. However, inflation exhibits a strong positive correlation with the lending interest rate. Moreover, fiscal balance shows a moderate positive correlation with the debt-to-GDP ratio and trade deficit, but a moderate negative correlation with the exchange rate, interest rate, oil prices and broad money.

Table 5 shows the DF-GLS and Phillips-Perron unit root tests at levels and first differences under drift and drift with trend specifications for all variables. The findings reveal that the majority of variables are stationary either at level or following first differencing. The stationary properties are evident because the test statistics are statistically significant. These variables include INF, FD, CAD, OIL, TD and M2. The results provide evidence of the integration order of the variables. Specifically, inflation (INF) and current account deficit (CAD) are strongly stationary at the level. While unemployment (UNEMP), debt-to-GDP ratio (DEBTGDP), exchange rate (EXR) and interest rate (INT) become stationary after first differencing, confirming their integration of order one, I(1). In conclusion, the findings reveal that there is mix order of integration.

Table 4: Correlation Analysis of Variables used in the Study

	INF	FD	UMEMP	CAD	DEBTGDP	EXR	INT	OIL	TD	M2
INF	1.000									
FD	-0.375	1.000								
UMEMP	-0.260	-0.426	1.000							
CAD	0.166	0.015	0.209	1.000						
DEBTGDP	0.360	0.436	-0.771	-0.148	1.000					
EXR	-0.110	-0.529	0.921	0.218	-0.776	1.000				
INT	0.812	-0.433	-0.202	0.129	0.070	-0.034	1.000			
OIL	0.313	-0.594	0.352	0.060	-0.539	0.432	0.520	1.000		
TD	0.128	0.534	-0.252	0.565	0.431	-0.282	0.025	-0.101	1.000	
M2	-0.149	-0.558	0.653	-0.174	-0.697	0.735	0.085	0.290	-0.671	1.000

Table 5: DF-GLS and PP Tests Results

Variables	**DF-GLS**				**Philips-Perron**			
	Drift		**Drift and Trend**		**Drift**		**Drift and Trend**	
	Level	**1st Difference**	**Level**	**1st Difference**	**Level**	**1st Difference**	**Level**	**1st Difference**
INF	-6.186***	-11.914***	-6.667***	-8.903***	-6.484***	-22.564***	-6.658***	-22.078***
FD	-2.449**	-6.761***	-2.740	-7.624***	-2.744*	-8.099***	-3.123	-8.189***
UNEMP	-0.416	-6.994***	-2.094**	-7.256***	-0.249	-7.072***	-2.108	-7.082***
CAD	-2.719**	-7.184***	-3.330**	-7.362***	-3.363***	-7.392***	-3.385***	-7.303***
DEBTGDP	0.411	-2.432*	-0.455	-3.114***	-11.036***	-4.685***	-1.367	-6.398***
EXR	1.041	1.958*	-2.243**	-1.067	6.222	-5.296***	4.223	-5.959***
INT	-1.591	-2.746*	-2.141**	-3.159***	-1.941	-2.589	-2.330	-2.905
OIL	-2.818***	-1.193	-3.226***	-1.250	-1.018	-6.833***	-2.376	-7.047***
TD	-2.262**	-7.409***	-2.362**	-7.842***	-2.274	-8.241***	-2.122	-8.449***
M2	-3.604***	-4.778***	-3.960***	-6.060***	-3.142**	-6.784***	-3.236*	-6.770***

The Bound F-test for Linear ARDL and Nonlinear ARDL (NARDL) to test the existence of the long-run association among the variables is shown in Table 6. The Bound F-test compares the calculated F-statistic with the lower bound (I(0)) and upper bound (I(1)) critical values at different levels of significance. According to the results, at all normal levels of significance, the computed F-statistic for the Linear ARDL forms is beyond the upper bound critical values.

Table 6: Bounds F-Test

Level of Significance	Linear-ARDL F-Statistic = 13.234		NARDL F-Statistic = 11.781	
	I(0)	**I(1)**	**I(0)**	**I(1)**
10%	2.323	3.566	2.248	3.501
5%	2.689	4.060	2.597	3.979
1%	3.527	5.181	3.400	5.068

This suggests that the linear specification indicates a strong cointegration among the variables. This implies that the explanatory variables and dependent variable move together in the long run. Thus, there is a long-run equilibrium relationship in the linear model. For the NARDL model, the F-statistic is above the upper bound critical values at all levels of significance, showing the existence of a long-run relationship, even under potential asymmetries. This means that changes in the independent variables, whether positive or negative, always have effects that last in the dependent variable.

Looking at the speed of adjustment given by the ECM term for both the LARDL and NARDL models is given in Table 7. It shows that the ECM term in both models is significant which means these models possess stable long-run adjustment mechanism. However, the extent of adjustment varies in the two models. With regard to the LARDL model, the ECM parameter has a negative sign and is statistically significant. Further, a large part of disequilibrium is corrected every year as it indicates a moderate speed of adjustment in the long-run equilibrium.

Table 7: ECM t-Bounds Test

Level of Significance	Linear-ARDL ECMt-1 =-0.054 t-bound = -9.504		NARDL ECMt-1 = -0.937 t-bound = -19.122	
	I(0)	**I(1)**	**I(0)**	**I(1)**
10%	-3.038	-4.702	-3.029	-4.793
5%	-3.378	-5.122	-3.371	-5.219
1%	-4.064	-5.957	-4.061	-6.068

On the other hand, the NARDL model has a larger absolute t-bound value, indicating that it has a stronger adjustment effect, which is also more rapid. The findings reveal that both models are stable in the long run. However, the adjustment process is better captured by the NARDL model, suggesting that it is important to take into account nonlinearities and asymmetries while examining long-run relationships.

Pesaran et al. (2001) and various studies (Goh et al., 2017; McNown & Sam et al., 2019) reaffirmed the need of testing for degenerate-dependent and degenerate-independent cases before applying ARDL to confirm the validity of long-run relationships. Thus, the evaluation was done in both cases for LARDL and NARDL models.

The results in Table 8 confirm the existence of a valid and stable long-run relationship in both the linear ARDL and nonlinear (NARDL) specifications. For the linear ARDL model ($k = 9$, $T = 63$), the estimated error-correction t-statistic ($t = –10.670$) is more negative than the corresponding I(1) critical values at the 1%, 5% and 10% significance levels, indicating that the dependent variable (inflation) adjusts significantly to restore equilibrium following short-run deviations. Similarly, the Wald F-statistic ($F = 7.20$) exceeds the I(1) upper bound at all significance levels, rejecting the null hypothesis of no cointegration and ruling out the degenerate-independent case.

Table 8: Degenerate-Dependent and Degenerate-Independent Cases

Level of Significance	LARDL				NARDL			
	t-Stat =-10.670		Wald-F = 7.20		t-Stat = -10.560		Wald-F = 7.10	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
10%	-3.038	-4.702	2.323	3.566	-3.029	-4.793	2.248	3.501
5%	-3.378	-5.122	2.689	4.060	-3.371	-5.219	2.597	3.979
1%	-4.064	-5.957	3.527	5.181	-4.061	-6.068	3.400	5.068

For the NARDL model (k = 10, T =63), an identical conclusion is obtained. The error-correction term is highly significant (t = –10.560), demonstrating a strong and stable adjustment mechanism toward the long-run equilibrium. The Wald F-statistic (F = 7.10) also exceeds the upper critical bounds at the 1%, 5% and 10% levels, confirming that the explanatory variables jointly determine inflation in the long run and rejecting both degenerate-dependent and degenerate-independent cases.

Taken together, these findings indicate that the long-run relationship is non-degenerate and economically meaningful in both the linear and nonlinear settings. Therefore, the long-run coefficients are valid for interpretation and the models provide reliable evidence of stable long-run linkages between inflation and its explanatory variables.

For the NARDL model, the LR test is used to check the weak exogeneity of the explanatory variables. Table 9 shows that some variables are weakly exogenous while some are not. Thus, showing that some of the variables are error correction while some are not. Specifically, the test indicates that several variables have p-values greater than the 5% significance level, suggesting that the null hypothesis of weak exogeneity cannot be rejected. These variables are thus deemed weakly exogenous and free from the effects of deviations from the long-run equilibrium. Nonetheless, test statistics for certain variables are near 5% significance level, thus showing endogeneity of these variables in the system. Also, it leads to rejecting the null hypothesis. The endogenous variables actively adjust back to a long-run equilibrium after any disequilibrium. In all, the outcomes indicate that while the variables are found to be weakly exogenous in the NARDL framework, several are active in the adjustment process which shows that the overall dynamic structure is balanced in line with the model expectations.

Table 9: NARDL Weak Exogeneity Test (Likelihood Ratio)

Variables	χ^2	p-value
α_{FD}	0.067	0.795
α_{UNEMP}	2.888	0.591
α_{CAD}	0.421	0.233
$\alpha_{DEBTGDP}$	3.624	0.056
α_{EXR}	0.255	0.613
α_{INT}	0.053	0.816
α_{OIL}	0.262	0.608
α_{TD}	0.808	0.368
α_{M2}	3.132	0.076

Table 10 provides the long run and short run estimates of both LARDL and NARDL models. The fiscal deficit (FD) has been found to have a positive and significant impact on inflation in the ARDL model. In the NARDL model, the positive component of fiscal deficit has negative

effects on inflation, whereas the negative component of fiscal deficit has positive effects on inflation. The findings for the ARDL model reveal that fiscal deficit has significance and a positive effect on inflation. This finding aligns with the Fiscal Theory of the Price Level (FTPL). According to Hussain et al. (2020) and Tule et al. (2019), inflation is caused by the fiscal, not the monetary, aspects of government policy. Fiscal imbalances lead to inflation (Hussain et al. 2020; Tule et al. 2019). In the event of economic crisis, the government borrows funds or prints more money. It increases money supply in economy and raising at further rate price levels. Spending deficit boosts aggregate demand which causes demand-pull inflation (Aimola, 2022). When fiscal imbalances persist, it can undermine investor confidence, lower the value of the currency and increase the cost of imports, leading to inflationary pressures that are felt throughout the economy (Kaur, 2021).

On the other hand, the NARDL model indicates an asymmetric relationship. Specifically, the positive component of the fiscal deficit negatively impacts inflation, while the negative component has a positive effect. The FTPL framework can also explain the phenomena. If the state incurs moderate fiscal deficits, the additional supply capacity and output as a result of productive investment would stabilize prices (Hussain et al., 2020; Tule et al., 2019). Also, when the economy is working below its potential, a short-term fiscal deficit will not lead to inflation as rising spending increases output not prices. The coordinated implementation of fiscal and monetary policies can further address inflationary pressures (Aimola, 2022). On the contrary, a lower fiscal deficit or fiscal surplus can raise inflation sometimes when spending cuts limit investment and output resulting in supply shortages and cost-push inflation. Also, the utilization of surpluses to pay down debts will hinder liquidity, leading to an appreciation of the exchange rate and a temporary rise in prices. This being the case, it is consistent with the findings of FTPL ((Kaur, 2021). The results of this study is in line with the following studies (Aimola, 2022; Kaur, 2021; Hussain et al., 2020; Tule et al., 2019).

The second variable is unemployment, which has a negative impact on inflation but it is statistically significant under the LARDL but insignificant in the NARDL model. Unemployment has a negative effect on inflation for a number of economic reasons. A higher level of unemployment usually means lower household income and consumption which weakens aggregate demand in the economy. When people have less money and make fewer purchases, businesses will have reduced sales and will be less likely to lift prices, causing inflation to decrease. According to the demand side of the inflation theory, prices will stop rising when the purchasing power collapses (Greenwood-Nimmo et al., 2011). When high unemployment occurs, there is surplus supply of labor over demand which suppress wage growth. Fewer jobs, more workers, making it hard for employee bargaining; no need to offer higher wages. As wages form a significant part of production costs, a stagnation or fall in wages helps to ensure stability in overall level of prices and even their fall. Low inflation owing to stable wages also helps to keep demand for money strong (Egede et al., 2023). High unemployment is mostly due to idle production capacity and underemployment of economic resources. When factories, equipment and labour are not fully employed, firms have no incentive to raise their prices as output is below potential. They usually try to keep prices the same or lower them to stimulate demand. This is explained by the Phillips Curve, which says that unemployment and inflation are inversely related. In other words, increases in unemployment will weaken consumer demand for goods and services, slowing down wage growth, causing excess capacity to build up in production and ultimately, all of this will create a deflationary pressure on the inflation rate (Arshad et al., 2016). This result validates the theory of Phillips Curve and the results matched with the following studies (Egede et al., 2023; Arshad and Ali, 2016; Greenwood-Nimmo et al., 2011).

The third variable is current account deficit that has a positive and significant impact on inflation in both LARDL and NARDL models. A current account deficit can lead to a

depreciation of the currency. A domestic currency which is weak will make the imported goods and inputs costly. This directly leads to an increase in the overall price level and generates imported inflation (Kılınç et al., 2016). When a country continuously exceeds its current account, it reveals other issues. This includes having too much domestic demand or expanding its fiscal too much. Since domestic consumption and investment are more than national output, the deficit is made up by imports and resulting in a larger deficit and further pushing up inflation (Alawin and Oqaily, 2017). To manage a large current account deficit, foreign borrowing and foreign aid are generally required. If left unchecked, it increases money supply and aggregates demand. The arrival of foreign funds does help in stabilization but may cause inflation due to rising liquidity and speculation. In addition, in developing economies that depend much on imported energy, food and raw materials, currency depreciation due to a current account deficit increases costs of production sectors and thus sustains inflation (Hussain et al., 2020). The result is in line with the following studies (Hussain et al., 2020; Alawin and Oqaily, 2017; Kılınç et al., 2016).

The fourth variable is debt to GDP ratio which has a positive and significant impact on inflation in both LARDL and NARDL models. Debt to GDP ratio has positive and significant impact on inflation for several economic reasons. First, an increasing debt to GDP ratio shows the government is borrowing heavily to fund its expenses. This can cause a jump in money supply if the debt gets monetized. When more money is available in the economy, demand-pull inflation is likely to happen (Harmon, 2012). In addition, high levels of public debt may weaken investor confidence in the government's fiscal state. This in turn lead to expectations of future inflation to decrease the real burden of debt repayment. If everyone behaves like that, price setter and wage negotiator behavior will also become inflationary (Lai et al., 2015).

One of the government debt disadvantages is that it depreciates the currency. Investors often demand higher returns because of risk. When the currency weakens, it raises the local price of imported products and input, leading to cost-push inflation. In many developing economies, food, fuel and intermediate goods are often imports that are central to production and consumption and such depreciation could raise inflation significantly. Also, paying so much debt each year moves public money away from useful things and toward interest payments. This makes it harder for supply to keep up. And then it slowly adds to inflation (Kurečić and Kokotović, 2016). The result is consistent with the following studies (Kurečić and Kokotović, 2016; Lai et al., 2015; Harmon, 2012).

The fifth variable is the exchange rate, which has a positive and significant impact on inflation in both LARDL and NARDL models. The exchange rate has a positive and significant impact on inflation through various linkages. The first impact of depreciation of the domestic currency is the direct increase in the prices of imported goods. Thus, the prices of goods like fuel, machinery and food items will increase. Further, the overall cost of production will increase because of this increase. Thus, the cost-push inflation in the economy will begin (Abdurehman & Hacilar, 2016).

Table 10: Long-Run and Short-Run Estimates

Linear ARDL				NARDL		
VARIABLES	**ECM**	**Long-Run**	**Short-Run**	**ECM**	**Long-Run**	**Short-Run**
FD		0.233***				
		(0.029)				
FD_POS					-0.927***	
					(0.146)	
FD_NEG					0.432***	
					(0.120)	
UNEMP		-0.490***			-0.568	
		(0.220)			(0.997)	
CAD		0.288***			0.345***	
		(0.063)			(0.126)	
M2		0.349*			0.727***	
		(0.196)			(0.224)	
EXR		0.610***			0.160***	
		(0.140)			(0.045)	
INT		-0.873***			-0.515***	
		(0.108)			(0.057)	
DEBTGDP		0.200*			0.882*	
		(0.101)			(0.452)	
TD		0.159***			0.618***	
		(0.028)			(0.091)	
OIL		0.857***			0.836***	
		(0.249)			(0.084)	
ECM	-0.054***		-0.937***			1.018*
	(0.006)		(0.049)			(0.558)
D(CAD)			1.015*			-1.129***
			(0.549)			(0.336)
D(M2)			-1.124***			-13.18**
			(0.317)			(5.703)
D(DEBT)			-13.24**			-0.619
			(5.489)			(1.926)
Constant			0.921***			0.266***
			(0.223)			(0.118)

When the exchange rate weakens, consumers get priced out of many goods as producers pass the exchange rate's effects on the imported portion of their production onto the final price. The final price is the consumer price. Hence, higher import costs will produce a general effect of increased price levels (Obradović, 2025). Moreover, consumers and producers can raise inflationary expectations through exchange rate depreciation. If people expect more depreciation, they may ask for higher wages or raise their prices in anticipation. Besides, a weak currency will make it expensive to service foreign-denominated debts. This forces governments to create more money or borrow further, which increases inflation (Matsvai, 2025). This result is matched with the following studies (Matsvai, 2025; Obradović, 2025; Abdurehman & Hacilar, 2016).

The sixth variable is the lending interest rate, which has a negative and significant impact on inflation in both LARDL and NARDL models. The lending interest rate has a significant negative effect on inflation as it reduces the cost of borrowing, thereby reducing consumer spending and business investment, thus lowering overall demand (Metieh & Mgbomene,

2025). Higher interest rates also motivate saving behaviour that curbs the money flow, further easing the price pressure. Similarly, an increased interest rate often boosts the value of the currency, making imports cheaper too. In this way, rising lending rates help in controlling inflation by stabilising demand (Rashid & Khalid, 2017). This result is consistent with the following studies (Metieh & Mgbomene, 2025; Rashid &Khalid, 2017).

The seventh variable is oil price. In both the LARDL and NARDL models, this variable has a positive and significant impact on inflation. Increasing oil prices cause inflation to rise due to the effect oil has on the cost of transportation and production. When oil prices increase, the cost of production and delivery also increases. As a result, the firms will transfer this increased cost to consumers (Mukhtarov et al., 2019). When our expenses for oil keep increasing, it also affects our money and weakens our currency. This makes a lot of imported items costlier. The price increase due to these effects has led to an increase in inflation due to the oil price increase (Bala & Chin, 2018). According to Bawa et al. (2020), Mukhtarov et al. (2019) and Bala and Chin (2018), this comes in line with their studies.

The eighth variable, the trade deficit, also positively and significantly impacts inflation in both the LARDL and NARDL models. The trade deficit has a positive and significant impact on inflation due to various reasons. When a country has more imports than exports, its demand for foreign currency will increase which causes a fall in domestic currency. When a currency depreciates, the foreign goods such as fuel and food and the imported raw materials get costlier. This is known as imported inflation (Yiheyis & Musila 2018). When a country has a trade deficit for a longer period of time, it shows that people are demanding for foreign goods. So, what is going to happen is it is going to cause a rise in the economy and an increase in prices. When a country borrowed from other countries to pay for more imports than it exported, the money supply would increase. If the money supply increases, demand-pull inflation occurs (Barthélemy & Cléaud, 2018). The following studies (Yiheyis & Musila, 2018; Barthélemy & Cléaud, 2018) match this result.

The last variable is broad money as a proxy of money supply, which has a positive and significant impact on inflation in both LARDL and NARDL models. When the money supply expands faster than real output growth, more money is chasing the same goods and services. It gives rise to demand-pull inflation (Ofori et al., 2017). An increase in broad money increases liquidity in the economy, which leads to higher spending by consumers and higher investment by firms. It raises aggregate demand and prices. When the amount of money in the economy is excessive and currency depreciates, it makes the price of imports higher and causes imported inflation. When people expect endless monetary expansion, expectations of inflation will rise. As a result, firms may raise prices and workers may demand higher wages (Gatawa et al., 2017). This result is in line with the following studies (Amassoma et al., 2018; Ofori et al., 2017; Gatawa et al., 2017).

According to the short-run findings in Table 10, inflation happens due to demand- and supply-focused factors and the two models display clear differences in the linear and nonlinear frameworks. According to the ARDL framework, fiscal consolidation lowers inflation by decreasing aggregate demand. The NARDL model shows an asymmetric relationship: expansionary (i.e. deficit spending) measures bring down inflation at first, before having the opposite effect later on. Contractionary measures bring prices upward. It indicates that fiscal policy shocks have different short-term effects depending on the shock. The nonlinear model of the economy shows that where there is an increase in unemployment, the inflation rate will fall, as this is an inverse relationship. However, this will not happen immediately as there is a time lag. Things outside the economy, such as a current account deficit and depreciation in the exchange rate amplify inflation pressures through price effects of imports. In the same line, public debt impacts inflation in the short term owing to issues with fiscal sustainability. Increasing interest rates restrict the flow of cash, which puts pressure on inflation, while a

growth in the amount of money raises it. The rise in oil prices has a strong cost-push impact. The increased cost of production leads to higher inflation. Additionally, the impact persists for long periods. To sum up the short run analysis, inflation dynamics are complex and asymmetrical, whereby the interplay of fiscal, external and monetary variables determines short run pricing.

The results presented in Table 11 attempt to determine whether the effects of the explanatory variables on inflation are symmetric or asymmetric in the long run and in the short run using the Wald or F-statistic. The results show the null hypothesis about symmetry is rejected in the long run as the calculated statistic exceeds the upper critical bound, implying the existence of long-run impact asymmetry. It suggests that a positive change in the fiscal deficit will increase inflation, which will decrease when there is a negative change in the fiscal deficit.

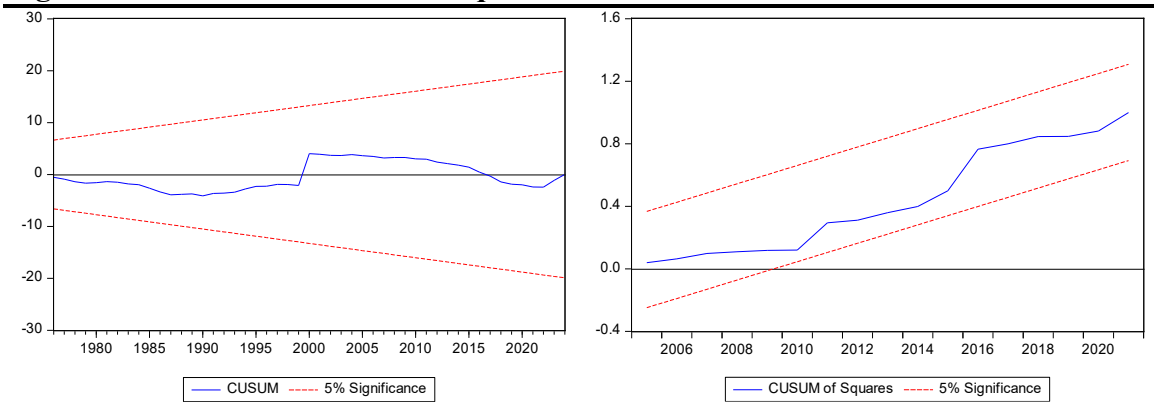
Table 11: Testing Impact Asymmetry

Type of Asymmetry	Wald/F statistic	I(0)	I(1)	Conclusion
Long-Run Impact Asymmetry	36.872	5.387	6.437	Asymmetry
Short-Run Impact Asymmetry	3.239	4.510	5.643	No Asymmetry

In other words, an increase in a variable has different effects on inflation than a decrease, as the latter will have a larger negative effect than the increase has a positive effect. On the other hand, the test statistic is below the upper critical value in the short run, implying no short run asymmetry. Short term inflation responses to positive and negative shocks are similar and the immediate effects of economic shocks are largely symmetric in nature.

The stability tests for the estimated model are shown in Figure 2 through the CUSUM and CUSUM of Squares. The figures show that during the entire sample period, the blue lines are located inside the 5 percent significance boundaries, indicating stability of the model's parameters. This means that the variables are not related to each other through any structural breaks. The coefficients are consistent and dependable in both the short run and long run, indicating that the model's predictive ability is steady. Thus, the LARDL and NARDL estimations can be considered structurally stable and hence relevant for policy interpretation.

Figure 2: CUSUM and CUSUM Square Tests



Conclusion and Policy Recommendations

The study's main aim was to examine the fiscal deficit and inflation link in Pakistan using the FTPL (Fiscal Theory of the Price Level) approach. It tried to establish if persistent budget deficits are the main cause of inflation other than demand and supply imbalance. This research fills a significant gap in the available literature which has largely focused on linear, monetary-

based models while overlooking the asymmetric, dynamic nature of the fiscal deficit–inflation nexus. Prior studies in Pakistan often examined the fiscal imbalances for price stability without considering the non-linear effects, institutional factors and fiscal dominance. Due to these limitations, this paper proposes a more encompassing and dynamic framework to capture the multifaceted and context-specific relationship between fiscal variables and inflation.

To hurdle this gap the study employed annual time series data (1960-2024) for Pakistan. The annual data are robustly fitted with ARDL and NARDL econometric models that assess both linear and non-linear association. The study used different factors as explanatory variables, including fiscal balance, exchange rate, unemployment, current account balance, interest rate, oil prices and money supply. The empirical evidence establishes that there is a long-run cointegrating relationship between fiscal deficits and inflation through the FTPL theory. In other words, this theory shows that when the fiscal deficit becomes unsustainable, inflation takes place. The findings show that inflation is more likely to occur when there are higher fiscal deficits, depreciation of the exchange rate and rise in oil prices. Therefore, maintaining fiscal discipline and effective coordination between fiscal and monetary authorities can help maintain price stability. In short, the study concludes that fiscal sustainability is essential for the long-term macroeconomic stability of Pakistan. Moreover, it stresses that fiscal and monetary policy must work together to bring down inflation.

Based on the results, the policy implications are given as.

- The study shows that the fiscal deficit raises inflation significantly. Hence, in order to check inflation, the policymakers implement fiscal discipline by cutting down unproductive expenditure, improving tax collection efficiency and improving budget transparency.
- The findings show that the depreciation of exchange rates can intensify levels of inflation. Monetary authorities should stabilize the exchange rate through foreign reserves management and ensure export competitiveness.
- According to the findings, a rise in oil prices leads to inflationary pressures. In order to reduce foreign oil dependence, the energy mix must be diversified through investment in renewable energy as well as energy efficiency measures.
- Analysis shows that higher interest rates help cool inflation. The central bank should avoid rates that will hold inflation in check without hindering investment and growth.
- The findings indicate that too much money creation can cause inflation. With a view to stabilizing prices, the State Bank should enhance monetary control mechanisms and pursue a cautious credit expansion policy.
- The results show that the current account deficit causes inflation to be higher. To improve the current account deficit, policymakers should encourage export-led growth, reduce import dependence and seek foreign direct investment.
- Based on the research, a lower rate of unemployment correlates with a higher rate of inflation in the short run. The Government should promote skill development and productivity growth to sustain employment without adding to inflationary pressures.
- The findings show that the higher the debt-to-GDP ratio, the higher the inflation expectations. Those in charge of finances should prioritize borrowing for productive use over spending for debt when managing their debts.
- A broadening trade deficit adds to inflation, according to the research. To reduce the trade gap, policymakers should improve export diversification, negotiate favorable trade agreements and help domestic sectors.

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