

Macroeconomic Factors Driving External Debt in Pakistan: The Role of Exchange Rate, Inflation Rate, Fiscal Deficit and Trade Openness

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Abstract

The rising external debt of Pakistan has become a serious issue for the policymakers over the past three decades. This research analyzes the macroeconomic drivers of external debt in Pakistan from 1995 to 2024, by concentrating on four quintessential variables: inflation rate, exchange rate, trade openness, and fiscal deficit. The main aim of this study is to explain how these variables influence the external debt of Pakistan. The Autoregressive Distributed Lag (ARDL) is utilized to examine the long- and short-term relationship among variables. Diagnostic tests such as multicollinearity, normality, heteroscedasticity, specification bias and unit root are performed to evaluate the model's validity. The result of this research reveals that in long run inflation, and fiscal deficit have statistically significant positive relations with external debt, while exchange rate is significantly negative relationship with external debt. The trade openness has also positive but insignificant relationship with the Pakistan's external debt. In the short run, exchange rate depreciation and inflation and fiscal deficit constantly fosters external debt.

Keywords: External Debt, Exchange Rate, Inflation Rate, Fiscal Deficit, Trade Openness,

Introduction

External debt refers to the total amount of money that a country borrows from foreign countries and international institutions like the IMF and World Bank, foreign governments, and private lenders. For developing countries like Pakistan, external borrowing is often needed to fill the gap between revenues and government expenditures, finance imports, and fund development projects. So, when borrowing expands sharper than the economy, it becomes a severe problem (Abbas & Christensen, 2010). External debt of Pakistan has been increasing for many years after the 1998 nuclear tests and international sanctions, the country's debt enhanced sharply. Multiple economic crises, large fiscal deficits, and recurring currency depreciations pressed the debt even greater over the following decades (Akram, 2011). In 2024, external debt of Pakistan as a share of GNI is at a significantly high level, making it one of the most indebted developing countries in South Asia (IMF, 2023). High debt service payments allot less money for schools, hospitals, and infrastructure, which reduces economic growth and development.

Figures 1 and 2 present the historical trends of inflation (INF), trade openness (TO), foreign direct investment (FDI), and external debt (ER) in Pakistan over the period 1995–2024. These figures illustrate considerable fluctuations in macroeconomic conditions and highlight the changing dynamics of Pakistan's external sector and fiscal position. Figure 1 shows the movements of

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inflation, trade openness, and foreign direct investment. Inflation remained relatively moderate during the late 1990s, fluctuating between approximately 6% and 13%, before experiencing an exceptional spike to nearly 68% in 2000. This sharp increase represents an outlier in the series and is followed by a rapid decline to single-digit levels in the subsequent years. Between 2001 and 2018, inflation generally remained below 15%, although temporary increases were observed around 2011 and again after 2019. A noticeable upward trend emerged after 2021, with inflation increasing sharply and reaching approximately 26% in 2023, reflecting severe macroeconomic pressures associated with exchange rate depreciation, supply-side disruptions, rising global commodity prices, and domestic fiscal imbalances. Although inflation declined slightly in 2024, it remained substantially higher than its historical average, indicating persistent inflationary pressures in the economy.

Trade openness exhibited relatively greater stability compared to inflation. During the mid-1990s, trade openness remained above 35% of GDP, suggesting a relatively stronger integration with international markets. However, it declined considerably around 2000–2003 to nearly 23–25%, reflecting reduced trade activity and slower external sector performance. From 2005 onwards, trade openness recovered gradually, fluctuating between 30% and 34% until the early 2010s before declining moderately after 2014. The indicator experienced another temporary improvement in 2022 but remained below the levels observed during the 1990s. Overall, the figure suggests that Pakistan's degree of openness has remained relatively stagnant over the last two decades, indicating limited progress in expanding international trade relative to the size of the economy.

Foreign direct investment remained comparatively low throughout the sample period and exhibited substantial volatility. FDI recorded persistent negative values during much of the study period, indicating weak foreign investment inflows relative to the scale of the economy and episodes of capital outflows. A brief improvement was observed around 2003, when FDI approached a balanced position, coinciding with economic reforms and relatively favorable investment conditions. However, investment flows weakened again during the following years, with particularly low levels observed around 2012–2013. Although modest recoveries occurred intermittently, FDI remained relatively subdued through 2024, reflecting the influence of political uncertainty, security concerns, institutional weaknesses, and an unstable macroeconomic environment on investors' confidence.

Figure 2 illustrates the trend in Pakistan's external debt over the same period. In contrast to the fluctuations observed in the other macroeconomic indicators, external debt displays a persistent and pronounced upward trajectory. Debt increased gradually from approximately US\$32 billion in 1995 to around US\$60 billion by the mid-2000s, followed by a steady increase to nearly US\$100 billion during 2013–2017. The most significant acceleration occurred after 2018, when external debt rose rapidly, reaching approximately US\$150 billion in 2019 and exceeding US\$200 billion by 2022. External debt peaked at nearly US\$280 billion in 2023, before recording a slight decline in 2024. This substantial accumulation reflects increased reliance on external borrowing to finance fiscal deficits, current account imbalances, infrastructure investment, and foreign exchange reserve management.

Taken together, the descriptive evidence indicates that Pakistan has experienced increasing macroeconomic instability over the study period. Inflation has become increasingly volatile, particularly during recent years, while trade openness has shown only limited long-term improvement. Foreign direct investment has remained relatively weak and unstable, suggesting persistent challenges in attracting foreign capital. At the same time, external debt has expanded considerably, especially during the last decade, highlighting growing dependence on external

financing. These preliminary trends provide important motivation for the subsequent econometric analysis, which investigates the long-run and short-run relationships among inflation, trade openness, foreign direct investment, external debt, and economic performance in Pakistan.

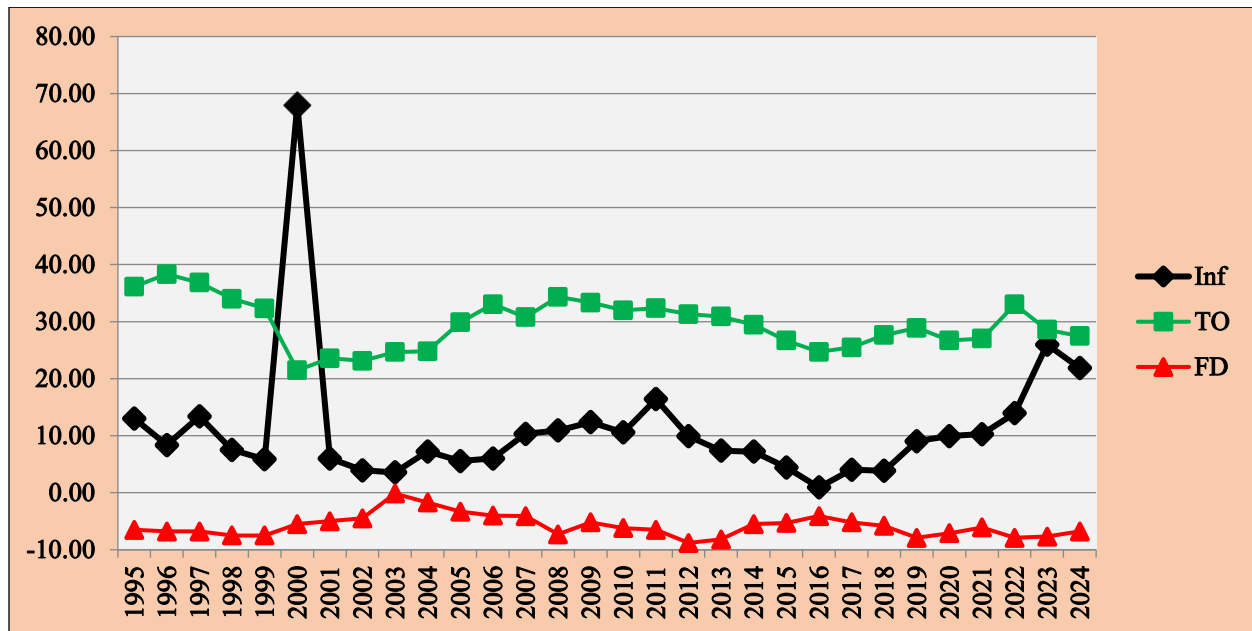


Figure 1. The Inflation, Trade openness and Foreign Direct Investment of Pakistan

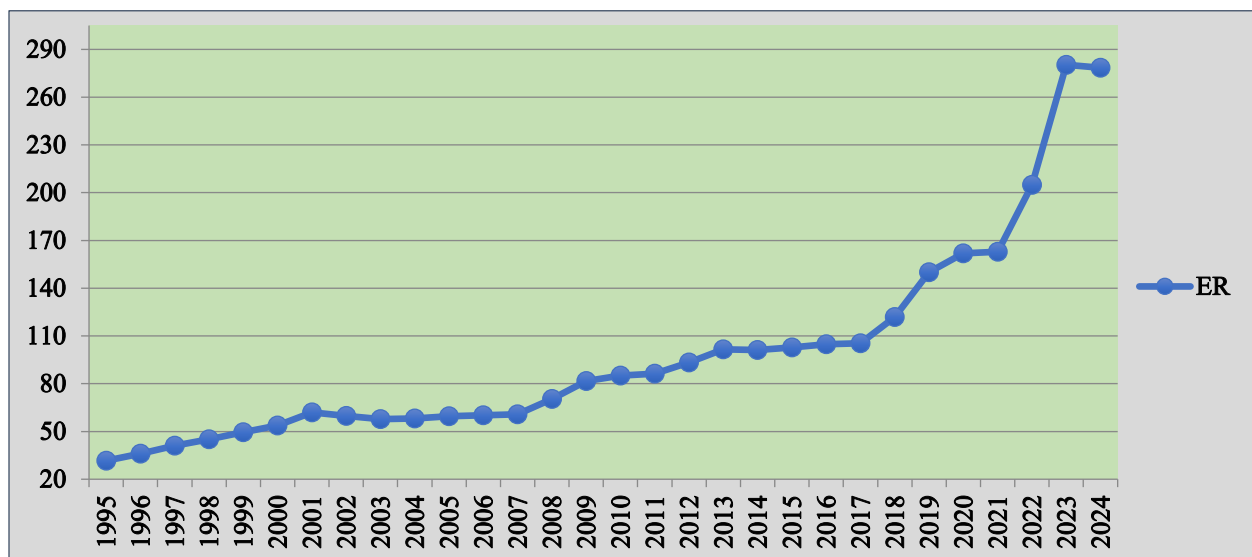


Figure 2. The External Debt of Pakistan

Despite numerous stabilization policies and repeated International Monetary Fund (IMF) programs, Pakistan's external debt has continued to increase over the past three decades, suggesting that the underlying macroeconomic determinants remain insufficiently understood. Existing theoretical and empirical studies identify several factors—including inflation, exchange rates, trade openness, fiscal deficits, and economic growth—as potential drivers of external debt accumulation (Chaudhry et al., 2012). However, the empirical evidence for Pakistan remains

inconclusive due to differences in model specifications, estimation techniques, and sample periods. Moreover, many previous studies rely on outdated datasets, focus on a limited number of explanatory variables, or fail to capture recent macroeconomic developments characterized by rising inflation, increasing external borrowing, and persistent external imbalances. Consequently, there remains a significant empirical gap in providing an updated and comprehensive assessment of the macroeconomic determinants of Pakistan's external debt.

To address this gap, the present study examines the effects of four key macroeconomic variables— inflation, exchange rate, trade openness, and foreign direct investment—on Pakistan's external debt using the most recent annual data covering the period 1995–2024. By employing a comprehensive econometric framework, the study provides updated evidence on both the long-run and short-run dynamics among these variables. The findings are expected to contribute to the existing literature by extending the empirical evidence on external debt determinants in developing economies, particularly Pakistan. Furthermore, the results offer important policy implications for the Ministry of Finance, the State Bank of Pakistan, and international development institutions, including the International Monetary Fund (IMF), by identifying the macroeconomic factors that should be prioritized for ensuring long-term debt sustainability and macroeconomic stability.

Literature Review

Various economic theories describe why economies accumulate external debt and what macroeconomic factors drive it, when debt gets too high it discourages investment because investors think that in future their profits to be taxed away to repay the debt. This creates a problem where high debt promotes low growth, which makes the country's debt even harder to repay. This theory is clearly appropriate to Pakistan economy, where high debt has constantly related to low investor confidence (Akram, 2011). In a country, high inflation usually indicates macroeconomic mismanagement which can diminish investor confidence that causes more external borrowing so domestic financing becomes insufficient. (Barro, 1979). In the long run, exchange rate depreciation can reduce the unnecessary imports of a country, boost exports and GNI, which reduces the debt ratio, while in other side in the short-term result revealing that exchange rate depreciation increases the local currency burden of external debt. Since the Pakistan's external debt is generally in US Dollars, so any depreciation of the Rupee directly increases the amount of repayment (Abbas & Christensen, 2010). Greater exports support foreign exchange earnings and diminish the need of borrowing. But if the imports are greater than exports so the current account deficit expands and needs external financing (Edwards, 1984). A fiscal deficit indicates a current account deficit, which requires external financing. Since Pakistan is facing fiscal deficits continuously, this mechanism has pushed up external borrowing (Rehman et al., 2010). A economy can borrow if it can create future income to repay the debt. When income growth is slow as compared to debt, a crisis becomes unavoidable (Javid & Schclarek, 2016).

Inflation and External Debt

The model in this research identifies inflation with a positive expected sign which means that extreme inflation shows macroeconomic instability and can urge governments for external borrowing, when domestic financing becomes too expensive (Barro, 1979; Munir et al., 2026). Chaudhry et al. (2012) discovered that inflation was an important factor of external debt in Pakistan. Hossain (2016) revealed that inflation in Pakistan was mainly driven by monetary expansion related to fiscal deficits, generating a direct connection among inflation, deficit financing, and debt.

Exchange Rate and External Debt

Exchange rate depreciation is one of the most significant drivers of external debt for economies with foreign currency denominated loans. When the PKR loses its value against the US Dollar, so the Rupee equals debt foster instantly (Javid & Schclarek, 2016). Umer et al. (2010) verified that changes in the exchange rate directly influences the external debt of Pakistan. The model identifies exchange rate with a negative expected sign in the long run showing that depreciation can also enhance exports and GNI which reduces the debt ratio. Reinhart and Rogoff (2010) noticed that exchange rates and debt crises frequently occur together in developing economies.

Trade Openness and External Debt

Trade openness is computed as the ratio of total exports and imports to Gross domestic product which can influence external debt in two ways. Greater exports support foreign exchange earnings and diminish the need of borrowing. But if the imports are greater than exports so the current account deficit expands and needs external financing (Edwards, 1984; Munir et al., 2026). In Pakistan, imports have historically exceeded exports, so trade openness has been more associated with import demand than export-driven growth. The model identifies trade openness with a positive expected sign showing that in context of Pakistan better trade integration has tended to expand the net export gap and thus rise external financing needs. Bua, Pradelli, and Presbitero (2014) discovered that current account deficits pushed by trade imbalances are main factors of external debt in emerging economies.

Fiscal Deficit and External Debt

The gap between government revenue and spending is called fiscal deficit. When this gap is large, the government must borrow either locally or externally to cover the gap (Rehman et al., 2010). Tax-to-GDP of Pakistan ratio is among the lowest in the developing countries. Akram (2011) discovered fiscal deficits to be a important factor of Pakistan's external debt. So the model also identifies fiscal deficit with a positive expected sign revealed that fiscal deficits in Pakistan causes monetary expansion and inflation which establishing a channel through deficits influence the debt burden Qayyum (2006).

Methodology

Data and Variables

This research employs yearly time series data for Pakistan covering from 1995 to 2024. Data on ED, INF, EXR, and TO is sourced from the World Bank WDI (2025). Data for FD is sourced from the IMF and State Bank of Pakistan/Ministry of Finance SBP/MOF (2025). External Debt is dependent variable in this study, measured as Pakistan's total external debt stocks in percentage of GNI. The independent variables include Inflation Rate which is calculated as the annual percentage change in the GDP deflator, exchange Rate measured as the annual average PKR per US dollar, where an increase indicates depreciation of the domestic currency. Trade openness, defined as ratio of total exports and imports measured as a percentage of GDP and Fiscal Deficit, measured as the overall government budget deficit as a percentage of GDP. Table 1 summarizes these variables.

Table.1. Variable Description and Data Sources

Variables	Abbreviation	Description	Source
External Debt	ED	Total external debt stock % of GNI	World Bank WDI (2025)
Inflation Rate	INF	Inflation GDP deflator (annual %)	World Bank WDI (2025)
Exchange Rate	EXR	Annual average PKR per US Dollar	World Bank WDI (2025)
Trade Openness	TO	(Exports + Imports) as % of GDP	World Bank WDI (2025)
Fiscal Deficit	FD	Overall Fiscal Deficit as (% of GDP)	IMF, SBP/MOF (2025)

Estimation Techniques

Time series data contain various econometric problems, such as unit roots, normality, Multicollinearity, heteroscedasticity, autocorrelation, and specification bias. The Augmented Dickey-Fuller (ADF) test was used to determine the stationarity of the variables. The Jarque Bera statistics were employed to investigate the normality of residuals. The Variance inflation factor (VIF) is applied to check the multicollinearity among variables. The heteroskedasticity among the residuals was tested through the Breusch Pagan Test. To examine the autocorrelation among residuals, Breusch-Godfrey Test was employed. Specification bias was inspected using the Ramsey RESET test. The ARDL Bounds Test by Pesaran, Shin, and Smith is used to test for a long-run cointegrating relationship. The Error Correction Model (ECM) captures the short-run dynamics and speed of adjustment. This sequence is the standard approach for time series analysis in economics research (Gujarati & Porter, 2009).

4.3 Econometric Model

$$\text{Log ED} = \beta_0 + \beta_1 \text{Log INF} - \beta_2 \text{Log EXR} + \beta_3 \text{Log TO} + \beta_4 \text{Log FD} + \varepsilon_t$$

Result and Discussion

The stationarity of variables is checked by Augmented Dickey fuller (ADF) test. The outcomes show that INF is stationary at level indicated by statistic of -5.09 and p-value of 0.00 , making it I(0). The remaining variables like ED, EXR, TO, and FD are non-stationary at level since their p-values (0.27 , 0.99 , 0.17 , and 0.18 respectively) are all above 0.05 . However, after taking the first difference, all four variables become stationary with p-values of 0.00 , 0.01 , 0.00 , and 0.00 respectively, making them I(1). The results of unit root test are presented in Table.2.

Table.2. Results of Unit Root Test (ADF)

Variable	At level	Prob.	At First Difference	Prob.	Decision
Log ED	-2.05	0.27	-4.91	0.00	I(1)
Log INF	-5.09	0.00	-	-	I(0)
Log EXR	0.63	0.99	-3.77	0.01	I(1)
Log TO	-2.34	0.17	-5.43	0.00	I(1)
Log FD	-2.25	0.18	-5.72	0.00	I(1)

Diagnostic Tests

The Normality Test gives a statistic of 0.91 with p-value 0.63, which is above 0.05. The residuals are normally distributed. This makes t-statistics and F-statistics valid (Jarque & Bera, 1987). The Heteroscedasticity Test gives a statistic of 0.59 with p-value 0.82, well above 0.05. There is no evidence of unequal variance in the residuals, confirming that the standard errors are. The Autocorrelation Test gives a statistic of 4.71 with p-value 0.04, which is below 0.05, indicating the presence of Autocorrelation. This is a frequent problem in annual time series data and has been corrected using HAC Newey-West standard errors, which make the coefficient estimates robust and valid even in the presence of autocorrelation (Newey & West, 1987). The Specification Bias Test (Ramsey RESET) gives a statistic of 0.86 with p-value 0.38, above 0.05. The model is correctly specified with no functional form misspecification.

To evaluate multicollinearity among the independent variables, the Variance Inflation Factor (VIF) test was employed. While the uncentered VIF values were relatively high for some variables, the centered VIF values are more robust for interpretation. The centered VIF values for all variables were less than the threshold of 10, with Log INF (1.14), Log EXR (1.43), Log FD (1.89), and Log TO (1.74). This provides evidence that there is no serious multicollinearity, and the estimated coefficients are stable and reliable for interpretation. All results are summarized in Tables 3 and 4.

Table.3. Diagnostic Test Results

Test	Statistic	p-Value	Decision
Normality Test	0.91	0.63	Residuals normally distributed
Heteroscedasticity	0.59	0.82	No heteroscedasticity present
Autocorrelation	4.71	0.04	Present; corrected via HAC-Newey-West
Specification Bias	0.86	0.38	Model correctly specified

Table.4. Result of Multicollinearity

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Log INF	0.02	2.18	1.14
Log ER	0.00	4.96	1.43
Log FD	1.51	19.61	1.89
Log TO	0.28	85.97	1.74
C	203.34	69.97	NA

The outcome of unit root test reveals, mixed order of integration, therefore (ARDL) model (Pesaran et al, 2001) is employed. ARDL is an estimation technique that is applied to examine both long term association and short-term dynamics between the variables, when they are stationary at I (0) and I (1). This model includes Bounds Test to verify long-run cointegration and Error Correction Term that calculates the speed of adjustment towards the long run equilibrium after short-run disturbance. The ARDL Bounds Test results present an F-statistic of 8.05, which is greater than the upper bound critical value of 4.37 at 1% significance level. This strongly refuses the null hypothesis of no cointegration and verifies the presence of a long term connection between

External Debt, Inflation, Exchange Rate, Trade Openness, and Fiscal Deficit over the study period. The results are displayed in Table 5.

Table.5. ARDL Bounds Test

Test Statistic	Value	Significance Level	I(0) Lower Bound	I(1) Upper Bound
F-statistic	8.05	10%	2.2	3.09
K	4	5%	2.56	3.49
-	-	2.5%	2.88	3.87
-	-	1%	3.29	4.37

Log INF the estimated coefficient for B1 is 0.42 which is statistically significant at 1% level. A 1% rise in inflation is linked with a 0.42% increase in external debt. Log EXR the estimated coefficient for B2 is -0.23. The outcome is significant at 1% level. A 1% surge in the PKR/USD exchange rate is allied with a 0.23% decrease in external debt. Log TO the estimated coefficient for B3 is 0.29. However, the result is not statistically significant ($p = 0.35$, above 0.05). Log FD the estimated coefficient for B4 is 0.19, which is significant at 1% level. A 1% rise in fiscal deficit is associated with a 0.19% increase in external debt. All four estimated coefficients have signs that are exactly consistent with the model specification. Three out of four independent variables INF, EXR, and FD is statistically significant. TO is not significant but carries the expected positive sign. This confirms both the validity of the model and the reliability of the empirical results.

Table 6. ARDL Long-Run Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log INF	0.42	0.11	3.74	0.00
Log EXR	-0.23	0.05	-4.29	0.00
Log TO	0.29	0.29	0.98	0.35
Log FD	0.19	0.06	2.97	0.01

The short-run ARDL results indicate that INF has a positive and statistically significant effect on ED, as a 1% increase in inflation increases external debt by 0.12%, while EXR has a strong positive and significant impact on ED. A 1% increase in the exchange rate increases external debt by 1.71% in the current period, while the lagged effects increase external debt by 1.88%, 2.35%, and 0.76% respectively. FD shows an insignificant current effect of 0.01%, but its lagged values positively affect external debt by 0.06%, 0.03%, and 0.03% over subsequent periods. The error correction term is negative and statistically significant, -0.63 signifies that approximately 63% of short-run disequilibrium is adjusted in each period, implying a relatively fast adjustment toward long-run equilibrium after short-run disturbances.

Table.7. ARDL Short-Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Log ED(-1))	-0.22	0.12	-1.82	0.10
D(Log INF)	0.12	0.01	8.93	0.00
D(Log EXR)	1.71	0.19	8.83	0.00
D(Log EXR(-1))	1.88	0.25	7.50	0.00
D(Log EXR(-2))	2.35	0.42	5.57	0.00
D(Log EXR(-3))	0.76	0.28	2.67	0.02
D(Log FD)	0.01	0.01	0.45	0.66
D(Log FD(-1))	0.06	0.02	3.07	0.01
D(Log FD(-2))	0.03	0.01	2.12	0.06
D(Log FD(-3))	0.03	0.01	2.35	0.04
CointEq(-1)	-0.63	0.07	-8.51	0.00

Conclusion

This research explored the macroeconomic factors of external debt of Pakistan over period 1995–2024 applying ARDL bound testing approach. ADF test results indicated a mixed order of integration, with inflation, being I (0) and remaining variables I (1), which explain the use of the ARDL model. The bound test gave an F-statistic of 8.05, verifying the presence of long-term relationship. The long-term results present that inflation, exchange rate, and fiscal deficit have statistically significant effect on external debt, while trade openness is insignificant. The estimated coefficient of inflation, exchange rate, fiscal deficit reassigns the repeated dependence of Pakistan IMF programs and debt rearranging during period of economic crisis. In short run exchange rate depreciation leads to consistent increase the external debt sustaining, the balance sheet effect. Inflation is also a reliable short run factor, while fiscal deficit effect external borrowing with delay of one to three years. The Error Correction Term displays a 63% annual correction speed, verifying that the system returns towards long-run equilibrium after any short-run disturbance (Pesaran, Shin & Smith, 2001; Engle & Granger, 1987). Moreover, these findings are also substantial for other developing economies that share similar structural characteristics such as fiscal imbalances, reliance on foreign currency borrowing and developing financial markets.

Policy Recommendations

The recommended policies are: First the State bank of Pakistan should build up foreign exchange reserves through higher exports earnings and remittances. A more managed exchange rate system could help to avoid currency depreciations. Second, Pakistan must expand its tax base, reinforce the Federal Board of Revenue and bring more of the informal economy into the formal tax net. Reducing the fiscal deficit will directly diminish the need for external borrowing. Inflation is a significant determinant of external debt in both the long run and short run. Third, The State Bank of Pakistan should maintain its independence and keep inflation within a stable target range. Price stability decreases uncertainty, reinforces the exchange rate and reduces the macroeconomic

instability that urges borrowing. Trade Openness is not significant because imports dominate. Fourth, Pakistan needs to rebalance its trade by enhancing exports in textiles, IT services, agriculture and pharmaceuticals. Higher exports earnings diminish the current account deficit and the need for external financing. Fifth, strengthening domestic bond markets through sukuk issuances, national savings instruments and corporate bonds can diminish dependence on external debt and lower exchange rate risk in the government's overall debt portfolio. Sixth, The Ministry of finance should set and publish clear medium terms targets for the debt to GNI ratio and ensure all new borrowing is done under favorable terms, long maturities, low interest rates, and concessional conditions wherever possible (IMF, 2023).

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