Unpacking The Contributing And Mitigating Factors of External Debt In Pakistan: An Ardl And Local Projection Approach

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Abstract: This study aims to investigate the root causes of burgeoning external debt in Pakistan and to identify potential ways to minimise the growing burden of external debt. By analyzing time series data from 1976 to 2022, using the Auto Regressive Distributive Lag Model (ARDL) bound test and local projection impulse response, the research finds a long-term relationship among remittances, external debt, and other variables. The results indicate that gross domestic product (GDP) growth rate, trade volume, and foreign exchange reserves play crucial roles in mitigating Pakistan's external debt, offering avenues for reducing the country's debt burden, as the probability values of their coefficients are less than 0.05. However, remittances, gross capital formation, and external debt servicing contribute to increasing external debt at a 5% significance level. The negative and significant error correction term (ECT) implies the system's stability and convergence. The study concludes that while remittances and gross capital formation have contributed to the increasing external debt, effective management of GDP growth, trade volume, and foreign exchange reserves can mitigate this burden. Based on these findings, it is recommended that the Government of Pakistan prioritize enhancing the GDP growth rate by channelling remittances and other foreign currency inflows, such as Foreign Direct Investment (FDI), foreign grants, and export earnings, towards building up foreign reserves.

Keywords: Remittances, external debt, foreign reserves, Auto Regressive Distributive lag, local projection, Pakistan

JEL Classification: F 00, F 24, F 31, C 22, F 34

1. Introduction

The funds sent by expatriate communities living abroad, which exceed foreign direct investment and come close to matching export earnings, have been acknowledged as a potential means to help alleviate the external debt burdens and financial and economic crises faced by low- and middle-income countries, including Pakistan, in recent years (Gupta et al., 2007; Knomad, 2022; Mijiyawa, 2022; Mijiyawa & Oloufade, 2022a). These remittances have proven highly beneficial by bolstering foreign reserves, mitigating the adverse consequences of current and capital account deficits, promoting stable consumption and investment, reducing poverty, fostering the development of human and physical capital, diminishing dependence on foreign borrowing, and ultimately contributing to the economic growth and development of these nations (Acosta et al., 2009; IOM, 2022; Iqbal & Sattar, 2010; Mol, 2023; Rashid & Samad, 2022; Sahu, 2015; Sutradhar, 2020).

In addition to their potential advantages, remittances could also expose countries to specific challenges, including the emigration of skilled workers (brain drain), rising inflation, the Dutch disease phenomenon resulting from a stronger real exchange rate, potential moral hazards within immigrant families, and a shift in the economy away from productive tradable sectors towards less efficient non-tradable sectors. These challenges could lead to increased foreign debt, diminished foreign reserves, and greater volatility in GDP growth rates (Chami et al., 2005; Mijiyawa & Oloufade, 2022a).

Simultaneously, foreign debt and the associated debt servicing have posed significant challenges for developing nations in various regions, including South Asia, Sub-Saharan Africa, Latin America, certain East Asian countries, as well as Greece, Poland, and some other Eastern European nations. These countries have amassed their external debt to levels that are no longer sustainable. Recent instances of sovereign debt defaults and financial obligations in countries like Sri Lanka, Argentina, Venezuela, and Lebanon have raised serious concerns among researchers, policymakers, international development and financial institutions, national governments in debtor nations, lenders, and donors at both the national and global levels (Kharas, 2020).

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Nonetheless, certain nations such as India, Mexico, the Philippines, Vietnam, and Bangladesh have effectively navigated their financial and economic challenges by skillfully managing substantial remittance inflows. They have used remittances as a substitute for external debt to bolster foreign exchange reserves, cover trade deficits, and service external debt commitments. In contrast, countries like Pakistan, which is the fifth most populous country globally and one of the top ten recipients of remittances, have recurrently faced financial and economic crises. These crises are attributed to factors such as the substantial burden of external debt and associated servicing costs, diminishing foreign exchange reserves, and erratic economic growth. These economic challenges stem from escalating imports, debt servicing, capital flight, money laundering, currency smuggling, non-development expenditures, corruption, economic mismanagement, and political instability (Bank, 2022; Hassani et al., 2021).

Pakistan's external debt has escalated to a level that raises concerns about its solvency. Ideally, with growing remittance inflows, external debt should not have reached such unsustainable levels. However, the lack of empirical evidence has left researchers and policymakers puzzled by this phenomenon. The existing literature demonstrates that the remittance and external debt nexus has rarely been explored, especially in the context of a single country case using time series data and models like ARDL and local projection. There are only two such studies conducted in a panel setting by Mijiyawa (2022) and Mijiyawa and Oloufade (2022a) who have also found contradictory results. In one study, remittances are negatively related to external debt, while in another study, remittances have positive impacts on foreign borrowing (Mahjoubi & Henchiri, 2024).

The paucity of empirical studies in country-specific cases and the mixed findings of studies in a panel setting warrant fresh and nascent research to delve into the remittance-external debt nexus by using the most updated and appropriate data and econometric techniques. Thus, this study intends to fill this gap by using appropriate time series models. Given the mixed order of integration of variables, applying the ARDL model enhances the validity and reliability of the results. Besides the ARDL model, the local projection impulse response by Jordà (2005) is also applied to validate the findings of the ARDL model. The Local Projection Impulse Response Function (IRF) offers several benefits: (1) it can be estimated using simple regression methods, (2) it demonstrates greater resilience to model misspecification, (3) making joint or point-wise inferences is straightforward, and (4) it readily allows for experimentation with highly nonlinear and flexible specifications, which may not be feasible within a multivariate framework (Jordà, 2005). Subsequently, this study is unique in its nature and very different from other studies conducted in this dimension.

The rest of the study is organized as follows: Section 2 discusses the trends in remittances, external debt, and foreign reserves. Section 3 consists of a theoretical and empirical review. Section 4 encompasses the methodology, data sources, econometric models, and their relevant diagnostic and robustness checks. The results discussion and policy implications/recommendations are presented in Sections 5 and 6, respectively.

1.1. Trends In Remittances Inflows, Foreign Exchange Reserves And External Debt

From 1976 to 1990, the average annual remittance inflow stood at approximately USD 2 billion. However, in the 1990s, this figure substantially declined to USD 1.43 billion per year. From 2001 to 2010, there was a significant surge, with remittances skyrocketing to USD 5.38 billion annually. This trend continued from 2011 to 2020, with a massive increase to USD 18.7 billion per year. Remarkably, despite the challenges posed by the COVID-19 pandemic, economic slowdowns, and lockdowns, remittances continued to rise, reaching USD 26 billion in 2021 and USD 29 billion in 2022. This resilience underscores the importance of remittances during periods of global health and economic crises.

Several factors contributed to the substantial increase in remittances during the first two decades of the twenty-first century. Firstly, overseas Pakistanis began utilizing formal banking channels to send their remittances following the 9/11 attacks. Secondly, worsening economic conditions and political instability in Pakistan led to increased emigration. Lastly, Pakistan's alignment with the United States and Europe in the war against terrorism in Afghanistan resulted in more employment opportunities for Pakistani workers in these regions.

On the other hand, foreign debt and its servicing have also skyrocketed during the last two decades, doubling every five years. Subsequently, the explosive and divergent nature of external debt and its associated servicing in Pakistan has become a perplexing challenge for both researchers and practitioners. The external debt has exceeded the sustainable level of 25% of GDP, reaching a historically high level of 54% of GDP in 1998-99, and the total public debt has crossed the constitutional limit of 60% of GDP set in "The Debt Responsibility and Limitation Act 2005" as following Figure 1.

2. Literature Review

2.1.1. Theoretical Review/Framework

2.1.2. Neo-Liberalism Theory

After the 1970s oil shocks, the Global North suggested a Neo-liberal political and economic doctrine (Washington Consensus) for the crisis-hit Global South by implementing the Structural Adjustment Program (SAP) through the International Monetary Fund (IMF), World Bank, World Trade Organization (WTO), and other international institutions. According to them, developing and underdeveloped countries should adopt

democratic political systems and liberal economic policies by minimizing the role of the state in economic management. They advocated for the privatization of state-owned enterprises, removal of restrictions from international trade, labour, capital, and currency markets, elimination of welfare subsidies and programs, and deregulation and decentralization of markets by embracing a free-market mechanism.
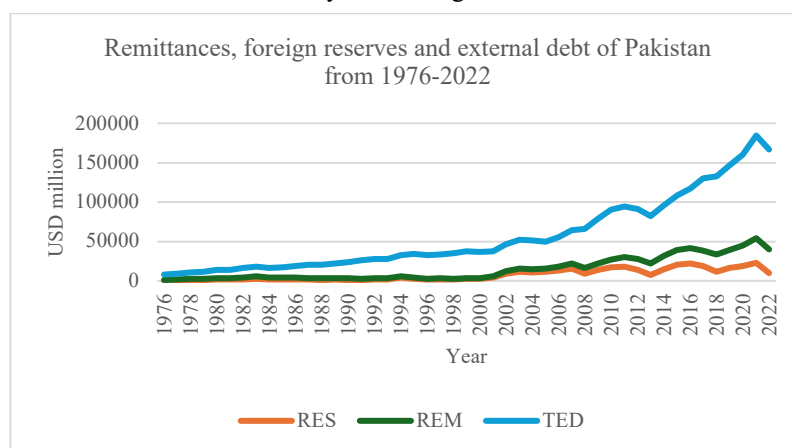

Figure 1: External Debt, Foreign Reserves and Workers Remittances in Pakistan

Following the legacy of neo-liberalism theory, restrictions on labour and capital markets were removed. Subsequently, developing countries, including Pakistan, which were labour-abundant but capital-scarce, started exporting more human resources to earn foreign exchange while heavily borrowing from abroad amid growing trade deficits that exerted pressure on their foreign exchange reserves and exchange rates. However, Ncube and Brixiova (2013) and Fullenkamp et al. (2008) argue that remittances play an imperative role in public debt sustainability as their availability increases tax revenue through consumption tax and inflation (seigniorage revenue) on one hand and primary surplus on the other hand, thereby increasing debt sustainability and creditworthiness of countries. In addition, the availability of remittances reduces the risk premium of government borrowing.

Remittances may be a substitute for external borrowing. An increase in remittance receipts may dampen the demand for external borrowing as they can be used to finance trade and fiscal deficits and overcome foreign exchange constraints. However, remittances may sometimes increase external debt as they can improve the creditworthiness of countries and reduce premium risks, thereby increasing the willingness of lenders to lend and borrowers to borrow. Consequently, the country may accumulate more external debt as shown in Figure 2.

2.1.3.   Dependency Theory

This theory explains the supply side of external debt. Lenders become more willing to lend to countries that are strategically located and have geo-economic and geo-political importance. It elaborates on why developed countries and their institutions keep providing loans to developing countries despite their falling creditworthiness and ratings. According to this leftist theory led by Karl Marx, the rich Global North countries (centre or core) have trapped the poor Global South (periphery) countries deliberately in external debt burdens to use them for their own national and personal gains. According to this theory, the political elite in less developed and developing countries serve the interests of rich countries in pursuit of their individual personal gains. Hence, both the developed countries and the political elite of developing and less developed countries squeeze and embezzle the resources and wealth of poor indebted countries and shift them to advanced developed countries' safe havens through corruption, capital flight, and money laundering by obtaining more and more loans (Ikejiaku, 2008) as shown in Figure 2.
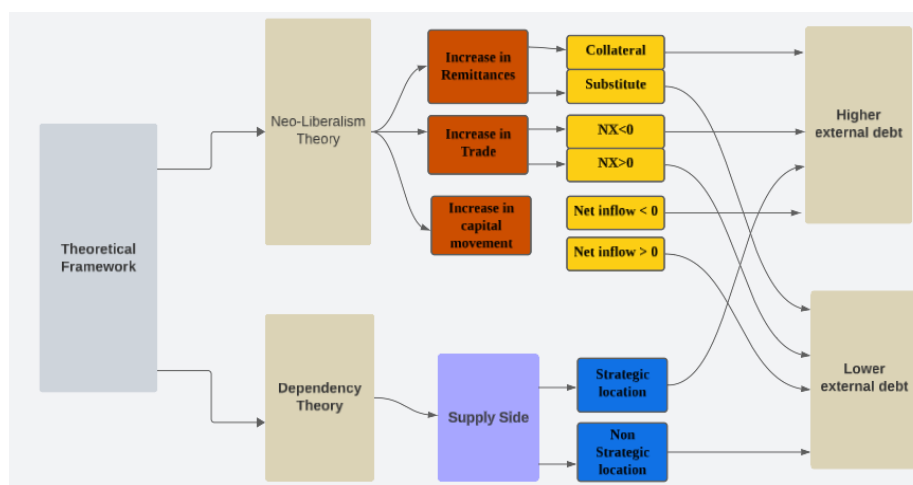

Figure 2: Theoretical Framework

2.1.4. Empirical Review

The existing literature on the topic shows the role of various factors in determining external debt, such as three gaps: export-import gap, revenue-expenditure gap, and saving-investment gap (Bacha, 1990). However, some studies have also included other variables in their research, such as GDP growth rate and investment (Dawood et al., 2021; Mensah et al., 2017), inflation (Bittencourt, 2015), foreign direct investment and debt servicing (Karagol, 2012), capital formation, exchange rate, interest rate (Abdullahi et al., 2015), foreign exchange reserves, oil prices (Waheed, 2017), corruption (Azolibe, 2021), military spending and internal ethnic conflicts (Dunne et al., 2019; Shahbaz et al., 2016; Anfofum et al., 2014), geopolitical and geo-strategic relationships, colonial relationships, volume of trade, terms of trade, etc. (Al-Fawwaz et al., 2016), financial deepening, and trade liberalization policy (Mughogho & Alagidede, 2021) and remittances (Bilquees, 2003; Mijiyawa, 2022; Mijiyawa & Oloufade, 2022a; Ncube & Brixiova, 2013). While the leftist wing believes that neo-liberalism and dependency theory, along with power games, are responsible for the heavy indebtedness of poor developing countries (Ikejiaku, 2008), the three-gap model and original sin theory are also regarded as the main factors behind the huge accumulation of foreign debt (Augustine & Kumar, 2020).

These empirical studies have been conducted in various contexts using different econometric models and data types, such as cross-sectional, panel, and time series data, to explore the role of various factors in explaining foreign debt in underdeveloped and developing countries. That's why they have reached different results. Some of these studies have used budget deficit, trade deficit, and saving-investment gaps in aggregate form, while others have used government spending, revenue, exports and imports, and saving, and investment separately as independent variables in their models.

Ahmad and Ahmed (1998), Ahmad (2024). Bilquees (2003), and Cheema (2004) using time series data, found that three gaps, burgeoning debt servicing, workers' remittances, non-development expenditures, and the government's choice to pursue economic growth through external sources were the main causes behind the heavy accumulation of external debt during the decades of the 1960s, 1970s, 1980s, and 1990s. They argued that Pakistan's external debt during the initial years was in the form of soft loans from multilateral and bilateral creditors with lower interest rates and longer maturity times. However, Pakistan started to borrow short-term hard loans from private commercial lenders during the 1990s and 2000s. They opined that the debt situation was manageable during the 1970s despite the falling growth rate because of its small size and conducive terms and conditions. The country had reached the brink of default in the 1980s. However, it was temporarily saved from default due to huge inflows of foreign capital amid Pakistan's decision to become a frontline fighter at the behest of the USA against the Soviet invasion of Afghanistan. The external debt service to foreign exchange earnings ratio in 1984-85 hiked to 31.6% from 20.4% in 1980-81 and remained on average at 18% per year during the 1990s.

The literature points out that non-development expenditures in general, and defence expenditures in particular, in heavily and severely indebted countries, are the main reasons behind the high accumulation of external debt. Shahbaz et al. (2016) and Anfofum et al. (2014) showed in their research that military spending has short-run as well as long-run positive relationships with external borrowing.

Likewise, Okwoche and Nikolaidou (2024) also found the positive and significant impacts of conflict, arms imports, and military spending on the external debt and gross government debt of Nigeria by applying the ARDL model over the data from 1970-2020. However, domestic debt is not significantly affected by conflict, arms imports, and military spending. They used three indicators of debt, namely gross government debt, external debt, and domestic debt. They also applied various robustness checks and found similar results.

Similarly, by including other variables, Brafu-Insaidoo (2019) explored the determinants of external debt in Ghana by applying the ARDL bound test and ECT term for both short-run as well as long-run relationships between the short-term stock of external debt and its determinants like the index of intensity of restriction, interest rate differentials (domestic-foreign) and used time series data from 1970 to 2012. He found that there is a negative relationship between short-term external debt stock and restriction index and a positive relationship between short-term external debt and interest rate differentials, GDP per capita growth rate, and domestic financial deepening both in the short run as well as the long run. While trade openness negatively affects external debt in the short run. However, short-term foreign debt is reduced in response to international debt reduction and relief initiatives by multilateral institutions in the long run.

Conversely, Al-Fawwaz et al. (2016) established that trade openness and terms of trade have a positive and statistically significant effect on external debt, whereas GDP per capita affects external debt significantly and negatively in Jordan. He used time series data from 1990 to 2014 and applied the ARDL bound test.

Similarly, Sağdıç and Yıldız (2020) conducted their research study regarding the factors affecting external debt in Central Asian countries using data from 1995 to 2017 and applying panel data models. They found that these countries have been borrowing from abroad to finance government spending, pay back previously taken loans, and finance current account deficits. However, domestic savings and inflation have been identified as potential avenues for minimizing their external debt burden as their coefficients are statistically significant.

Developing countries opt for external borrowings to maintain their foreign exchange reserves to build the trust of foreign investors. Pyeman (2016) determined the factors of external debt in Malaysia by using

time series data from 1972 to 2012 and applying multiple regression and Granger causality models. They found that GDP and FDI affect external debt negatively and significantly, whereas exports affect external debt positively and significantly. This result seems to be strange since other studies have found a negative relationship between external debt and exports in line with the theory. This may be due to the positive effect of exports on foreign reserves, which serve as collateral, thereby increasing the creditworthiness and thus the external debt of Malaysia. Another possible explanation is that foreign-borrowed funds are allocated to export-oriented industry development. They also established that there is no Granger causality between GDP and external debt, while bidirectional Granger causality exists between external debt and FDI, whereas there is unidirectional causality between external debt and exports.

Likewise, Nazamuddin et al. (2024) view that external debt and foreign reserves in Indonesia are positively and significantly related in the long run, while foreign reserves negatively impact external debt in the short run. Similarly, the exchange rate has asymmetric positive impacts on Indonesia's external debt. The effects of currency appreciation are more severe compared to depreciation. They used an ARDL and nonlinear ARDL model to analyze data from 2010 to 2019. The system is convergent as the ECT term is negative and significant. They recommended that Indonesia should let the currency depreciate in a floating exchange rate system in the market.

Literature also reveals that bad governance and corruption are the main reasons behind the unsustainable accumulation of external debt in highly indebted poor countries. Azolibe (2021) found that external debt is positively and significantly dependent on corruption and unemployment and negatively and significantly related to foreign exchange reserves and GDP growth rate. He suggested that in order to manage external debt in these countries, good governance should be focused on and corruption should be controlled to utilize borrowed money on productive projects rather than luxuries. Similarly, Alesina and Weder (2002) found in their working paper that less corrupt governments receive less foreign aid, whereas more corrupt governments receive more foreign aid not only in bilateral terms but also in multilateral terms. It shows that foreign aid is awarded not based on economic viability and performance of institutions but rather based on colonial relationships, geopolitical relationships, and the strategic location of recipient countries that could fulfil the vested interests and power games of donor countries.

Most of the studies have found a positive relationship between external debt and fiscal deficit. However, one study conducted by Abdullahi et al. (2015) found that exchange rate, interest rate, and budget deficit are negatively related to external debt in both the short run and the long run. The possible reason behind the negative effect of the budget deficit on external debt may be a change in government priorities to finance its deficit through domestic borrowing instead of foreign borrowing. However, the adjustment process in the short run seems to be very weak. They carried out their research study on the main determinants of foreign debt in Nigeria by applying the Auto Regressive Distributive Lag Model bound test over the period from 1980 to 2013. They suggested that the government should carefully sign foreign debt agreements to avoid the bad experiences of the past.

Conversely, Lubis (2020) established that Indonesia's external debt is positively and significantly affected by the budget deficit and inflation, while it is negatively impacted by economic growth and exchange rate in the long run. However, in the short run, only inflation has a positive and significant impact on external debt, whereas GDP growth, budget deficit, and exchange rate have positive nexus with external debt but are statistically insignificant. They used an ARDL and ECT over data from 1998 to 2017.

Moreover, recently Désiré et al. (2024) have found a negative nexus between remittances and public debt in 48 African countries by applying the generalized method of moments (GMM) on panel data from 1990 to 2020. Their findings indicate that migrant remittances decrease public debt in Africa, suggesting that a 1% rise in remittance levels could lead to a 0.015% decrease in the public debt of African nations. Remittances have the potential to lower public debt by expanding the national tax revenue base, boosting foreign exchange earnings, and affecting exchange rate disparities, contingent on whether the country's currency is pegged to a foreign currency or not. They suggest that policymakers should create incentives to encourage formal remittances through digital platforms, especially by streamlining costs and procedures. Additionally, they propose implementing policies aimed at integrating the diaspora more effectively into significant development initiatives in Africa. They emphasize directing remittances towards productive investments, aligning with local development strategies, which could eventually support the establishment of a sustainable national currency.

Similarly, Mijiyawa (2022) carried out a research article to ascertain the drivers of the growing external debt to GDP ratio in HIPCs after the HIPC initiative and MDRI during 2005-2016 by using panel data of 18 HIPCs who reached the completion point by 2005. They used a fixed effect model based on Hausman test results. They found that GDP growth rate, nominal exchange rate, and remittances have negative and significant effects on the external debt to GDP ratios of 18 HIPCs. However, the institutional and management index variable CPIA has been positively contributing to the external debt to GDP ratios of HIPCs after the HIPC initiative and MDRI initiative. While the foreign direct investment, fiscal deficit to GDP ratio, and terms of trade have negative coefficients but are statistically insignificant.

However, in another article, Mijiyawa and Oloufade (2022b) found contradictory results by conducting research on the effects of remittances and foreign reserves on the external debt of low and middle-income countries (LMICs) by applying the system generalized method of moments (GMM) and employing panel

data of 50 LMICs from 1970-2017. They used averages of four years. They found that remittances positively contributed to external debt and international reserves negatively impacted external debt, hence the Dutch disease effect of remittances and self-insurance mechanism of foreign reserves are prevailing in LMICs. However, other variables such as the GDP growth rate and the saving-investment gap also have negative effects on external debt. Besides, the nominal exchange rate and USA lending interest rate influence external debt positively. They also used various robustness tests to validate the results. While the political index variable of democracy and autocracy is found to be statistically insignificant.

Literature also highlights that the presence of huge workers' remittances is not only helpful in stimulating domestic consumption and investment but also in financing reverse flows in the form of external debt services, capital flight, and the buildup of foreign exchange reserves. Das et al. (2021) conducted research in Jamaica, a huge recipient of remittances in the Caribbean region, by estimating the net export equation through the Auto Regressive Distributive Lag Model and incorporating time series data from 1976 to 2017. They found that USD 0.24 of each dollar of remittances is allocated to finance the reverse flow, while the remaining USD 0.76 of every dollar of remittances is channelled into domestic consumption and investment. Similarly, Ncube and Brixiova (2013) in their working paper found that workers' remittances have positive impacts on public debt sustainability in Egypt.

2.1.5.   Research Gap

After evaluating and synthesizing the existing literature on the remittances-external debt nexus, we have identified two types of gaps: contextual and methodological.

Contextual Gap: To the best of our knowledge, the impacts of remittances on external debt in Pakistan have hardly and rarely been researched before. Moreover, none of the studies have applied an ARDL and local projection impulse response function methodology simultaneously. Thus, this study intends to fill these gaps by exploring the effects of remittances and other relevant variables on the external debt of Pakistan using data from 1976 to 2022 and applying the most appropriate methodology to ensure the validity and robustness of the results.

3.   Empirical Analysis

3.1.1.   Empirical Model

To ascertain the nexus between remittances and other macroeconomic variables and external debt, the following model (Equation 1) will be estimated:

$$ED_t = \alpha + \beta_1 WR_t + \beta_2 GCF_t + \beta_3 GDP_t + \beta_4 TRDGDP_t + \beta_5 RES_t + \beta_6 TDS_t + \mu_t \ldots \ldots \ (1)$$

In Equation 1, the workers' remittances (WR), GDP growth rate (GDP), and foreign reserves (RES) have been included by following Mijiyawa (2022) and Ncube and Brixiova (2013), who have researched the effects of remittances, foreign reserves, and GDP on external debt and its sustainability. Other variables such as trade, gross capital formation, and external debt servicing are included by following Bölükbaş (2016), Waheed (2017), and Tiruneh et al. (2004), respectively.

3.1.2.   Variable Description and Data Source

The details of variables used in Equation 1, including abbreviations, descriptions, and sources, are shown in Table 1.

Table 1: Included Variables in models, their abbreviations, description and sources.

Variable	Abbreviation	Description	Source
External debt	ED	ED as % GDP	WDI
Gross capital formation	GCF	GCF as a % of GDP	WDI
Gross Domestic Product	GDP	GDP growth rate	WDI
Worker's remittances	WR	WR as a % of GDP	WDI
Foreign Exchange Reserves	RES	RES as a % of external debt	WDI
External debt servicing	EDS	EDS as a % of GDP	WDI
Trade	TRDGDP	Trade as % of GDP	WDI

Source: Calculated by the Author

In the above Equation 1, the GDP growth rate is expected to have a negative nexus with external debt, while gross capital formation (GCF) and external debt servicing (TDS) are expected to have a positive relationship with external debt. Similarly, workers' remittances (WR) and foreign reserves (RES) can have either positive or negative coefficients. If reserves are maintained for precautionary motives, their coefficients will be negative; otherwise, they will be positive if maintained for collateral purposes. Likewise, remittances may have both positive and negative relationships with external debt. If remittances serve as a substitute/alternative to external debt, their coefficient will be negative; otherwise, it will be positive if considered as collateral for external debt. Similarly, the volume of trade to GDP ratio (TRDGDP) is also expected to have both possibilities. It can have a positive sign if the magnitude of imports is greater than exports; otherwise, it will be negative if the magnitude of exports is greater than imports.

3.1.3. Estimation Method

First of all, the unit root properties are checked by applying the KPSS test. After that, Equation 1 is estimated by applying the Auto Regressive Distributive Lag Model (ARDL) bound test developed by Pesaran et al. (2001). The main reason for using the ARDL model is that the included macroeconomic variables are stationary at different levels. Some are stationary at level, while others are stationary at the first difference. However, no series becomes stationary at the second difference.

The ARDL model specification for the long run in Equation 1 is shown in Equation 2.

$$\Delta ED = \beta_0 + \sum_{i=1}^{q} \beta_{1i} \Delta ED_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta WR_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta TRDGDP_{t-i} + \sum_{i=1}^{p} \beta_{5i} \Delta TDS_{t-i} + \sum_{i=1}^{p} \beta_{6i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta RES_{t-i} + \sum_{i=1}^{p} \beta_{8i} \Delta GCF_{t-i} + \gamma_0 ED_{t-1} + \gamma_1 WR_{t-1} + \gamma_2 TRDGDP_{t-1} + \gamma_4 TDS_{t-1} + \gamma_5 GDP_{t-1} + \gamma_6 RES_{t-1} + \gamma_7 GCF_{t-1} + \mu_t \dots\dots eq\ 2$$

The ARDL model specification for the long run and short run with ECT generation for Equation 1 is as Equation 3

$$\Delta ED = \beta 0 + \sum_{i=1}^{q} \beta_{1i} \Delta ED_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta WR_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta TRDGDP_{t-I} + \sum_{i=1}^{p} \beta_{5i} \Delta TDS_{t-i} + \sum_{i=1}^{p} \beta_{6i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta RES_{t-i} + \sum_{i=1}^{p} \beta_{8i} \Delta GCF_{t-i} + \delta ECT_{t-1} + \upsilon_t \dots eq3$$

4. Hypothesis

Null Hypothesis: There is no long-run and short-run co-integration among the variables.
Alternative Hypothesis: There is long-run and short-run co-integration among the variables.

4.1.1. Decision Rule

First of all, to check the long-run relationship, the F-statistics will be computed and compared with the critical lower and upper-bound values developed by Pesaran et al. (2001). If the calculated F-statistics is greater than the upper bound value, the null hypothesis of no long-run relationship will be rejected, meaning that there is a long-run relationship between the variables. If the F-statistics is less than the lower bound value, the null hypothesis of no long-run relationship cannot be rejected. However, if the F-statistics lie between the upper and lower bound values, the result will be inconclusive.

Once the long-run relationship is determined based on the F-test, the short-run coefficients of variables and the ECT term are generated to check the short-run relationship between the variables and the speed of convergence (or divergence) to equilibrium when the economy deviates from its equilibrium position due to any shock in the system. If the coefficient of the ECT is negative and significant, the model is said to be stable and converging to its equilibrium position; otherwise, it will be unstable and divergent.

Besides applying an ARDL, the local projection impulse response function by Jordà (2005) is also used to support the findings of the ARDL model. The Local Projection Impulse Response Function (IRF) offers several benefits: (1) it can be estimated using simple regression methods, (2) it demonstrates greater resilience to model misspecification, (3) making joint or point-wise inferences is straightforward, and (4) it readily allows for experimentation with highly nonlinear and flexible specifications, which may not be feasible within a multivariate framework (Jordà, 2005).

5. Results Discussion

5.1.1. Data Visualization

Graphical presentation of the data through a box plot shows that the data is normally distributed. There is no outlier in the data, as shown in Figure 3. The mean and median values of most of the series are equal or close to each other.
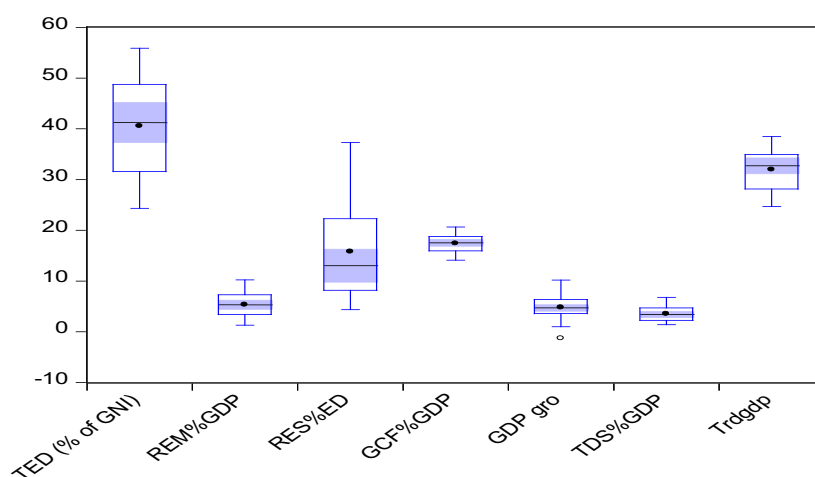

Figure 3: Data Visualization through a Box plot

5.1.2. KPSS unit root test

Shows the outcomes of the KPSS test for unit root. The null hypothesis in the KPSS test is contrary to that of the ADF test. In the KPSS test, the null hypothesis assumes that the series is stationary, whereas in the ADF test, the null hypothesis assumes that the series is non-stationary. The findings indicate that the remittances and trade to GDP ratio remain constant at a certain level, while other variables such as the external debt to GDP ratio, GDP growth rate, gross capital formation to GDP, foreign reserves to external debt ratio, and external debt servicing to GDP ratio experience changes over time. Given that the variables have different levels of integration, it is suitable to utilize the ARDL bound test to assess the long-term effects of independent variables on the dependent variable. To estimate short-run coefficients using a difference operator, it is necessary to determine if a long-run relationship exists. Subsequently, it is necessary to create the ECT term to assess the long-term speed of adjustment when the system deviates from the equilibrium level.

Table 2: KPSS Unit Root Test

Variable	Level	1st difference	Conclusion
ED	0.5559** significant	0.0859 insignificant	I(1)
GCF	0.5876** significant	0.0828 insignificant	I(1)
GDPG	0.4488* significant	0.2363 insignificant	I(1)
TDSG	0.3858* significant	0.1318 insignificant	I(1)
REM	0.1871 insignificant		I(0)
RESED	0.3493* significant	0.1965 insignificant	I(1)
TRDGDP	0.3071 insignificant		I(0)

*,** & *** show the significance level at 10%, 5% and respectively

5.1.3. Long Run Coefficients and Bound Test Results

ARDL (p,q) = (2, 0, 1, 1, 1, 2, 1) is selected after evaluating the 1458 models based on the Akaike Information Criterion (AIC) with its minimum value. The maximum lag length determined based on various information criteria is two. Table 3 shows the ARDL long run, short run, and ECT coefficients. The F-statistic of 10.77 is higher than the critical values of the upper bound at the 1% level of significance for six independent variables (K = 6). This implies that there is a long-run co-integration between external debt and the other independent variables.

More specifically, remittances are positively and significantly related to external debt. This implies that keeping other things constant, if remittances increase by one percentage point, the external debt to GDP ratio will increase by 0.95 percentage points and vice versa. The positive coefficient of remittances indicates that remittances in Pakistan are considered collateral and complement for foreign borrowing by the government of Pakistan and lenders, as they increase the creditworthiness of the country. This finding aligns with Mijiyawa and Oloufade (2022a).

Moreover, foreign exchange reserves negatively and significantly affect the external debt of Pakistan in the long run. This shows that if the foreign reserves to external debt ratio increase by one percentage point, the external debt to GDP ratio decreases by 0.39 percentage points, all else equal. This also matches the findings of Mijiyawa and Oloufade (2022a). This means that foreign reserves in Pakistan are maintained for precautionary motives by accumulating them in good times and utilizing them in bad times. Whenever foreign reserves fall below the minimum required level equivalent to an import bill of three months, Pakistan is compelled to borrow from abroad.

Besides, gross capital formation, which is a proxy for domestic investment, contributes to external loans positively and significantly. This finding aligns with the expectation according to theory and the findings of Bacha (1990). A one percentage point increase in gross capital formation leads to an increase in the external debt-to-GDP ratio by 2.81 percentage points, keeping other things constant. This means that a major portion of investment is financed through external sources/funds as domestic savings are very low in Pakistan. It confirms that Pakistan has been borrowing from abroad to finance the saving-investment gap.

However, the GDP growth rate and trade-to-GDP ratio have negative and significant relationships with external borrowings. A one percentage point increase in GDP growth rate and trade to GDP ratio results in a decrease in the external debt to GDP ratio by 1.89 percentage points; ceteris paribus. This finding aligns with expectations per theory and with the findings of Dawood et al. (2021), Azolibe (2021), Tiruneh et al. (2004), and Bittencourt (2015).

Likewise, if the trade-to-GDP ratio increases by one percentage point, the external debt-to-GDP ratio will decrease by 0.402 percentage points, keeping other things the same. This finding is also expected according to the

theory and aligns with the findings of Beyene and Kotosz (2020) and Brafu-Insaidoo (2019). However, these findings contrast with the findings of Bölükbaş (2016).

External debt servicing to GDP ratio is positively and significantly affecting the external debt of Pakistan. This implies that a one percentage point increase in the external debt servicing to GDP ratio leads to an increase in the external debt to GDP ratio by 3.86 percentage points; all else being equal. This finding matches those of Karagol (2012), Tiruneh et al. (2004), and Chaudhary et al. (2000). This means that Pakistan has been borrowing from abroad to pay back already taken loans, which rightly confirms the real situation in Pakistan.

The short-run results indicate that the external debt problem of Pakistan is persistent as the lag value of the dependent variable is significant. GDP growth rate affects the external debt to GDP ratio negatively and significantly in the short run, while the external debt servicing to GDP ratio has a positive and significant contribution to the external debt burden of Pakistan in the short run as well. However, gross capital formation has a positive relationship with external debt in the short run but is statistically insignificant. Similarly, foreign reserves also have a negative impact on external debt in the short run but are statistically insignificant.

The negative and statistically significant coefficient of ECT implies that the system is convergent to the equilibrium level after it deviates from the equilibrium conditions. More specifically, approximately 55% of adjustment and convergence from disequilibrium to equilibrium occur within one year. R-square and adjusted R-square values demonstrate that variations in the dependent variable are explained by 78.7% and 74.6%, respectively, indicating a good fit of the model. The Durbin-Watson test is around two, which suggests that the model is free from autocorrelation problems.

Table 3: ARDL long run, short run and ECT coefficients

Long-Run results Variable	Coefficient	Probability	SR results and ECT Variable	Coefficient	Probability
REM	0.956776*	0.0043	D(TED(-1))	0.165449***	0.0806
RESED	-0.391816*	0.0006	D(RESED)	-0.020456	0.7298
GCF	2.816292*	0	D(GCF)	0.228543	0.5576
GDPG	-1.895597*	0.0034	D(GDPG)	-0.518495*	0.0002
TDSG	3.864697*	0	D(TDSG)	0.759003***	0.0669
TRDGDP	-0.40213***	0.0905	D(TDSG(-1))	-1.551288*	0.0011
F-statistic	10.77263		D(TRDGDP)	0.148358	0.2467
K	6		ECT	-0.546713*	0
R-squared	0.78708				
Adjusted R-squared	0.746798		DW	2.055617	

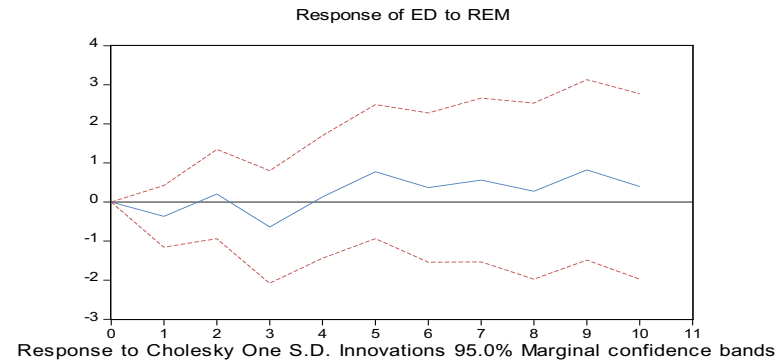*, ** and *** indicate significance level at 1%, 5% and 10% respectively.

5.1.4. Local Projection Impulse Response Function

The findings of the local projection impulse response function are displayed in Figure 4. The results are comparable to those of the ARDL findings. An increase of one standard deviation in remittances initially reduces the foreign debt, but after one period it raises the burden of external debt. Similarly, a one-standard-deviation rise in gross capital formation leads to a three-period increase in foreign debt. Similarly, a one standard deviation rise in external debt servicing results in an increase in the external debt after one time period. On the other hand, a one standard deviation increase in the GDP growth rate leads to a reduction in external debt for one year. In addition, a one standard deviation gain in foreign reserves leads to a drop in external debt for a period of up to two years. Furthermore, a one standard deviation improvement in the trade-to-GDP ratio results in a reduction in foreign debt within a one-year time frame.
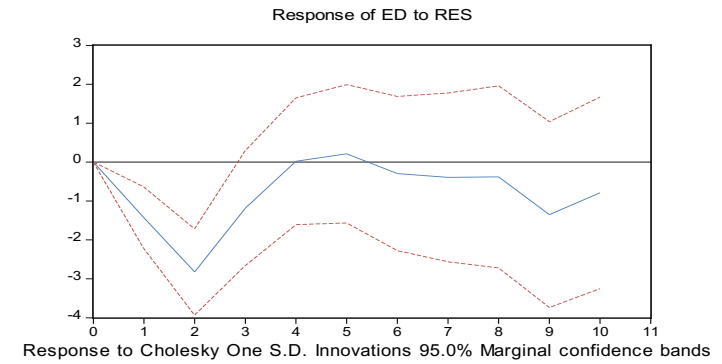
5.1.1. Robustness, Validity and Reliability Test

The data is moreover evaluated using a fully modified OLS model and the Johansen co-integration test to assess the reliability of the findings. The outcomes of the Fully Modified Ordinary Least Squares (FMOLS) approach are roughly equivalent to those obtained from an Autoregressive Distributed Lag (ARDL) model. In addition, the trace statistic indicates the presence of three co-integration equations, whereas the highest Eigenvalues suggest the existence of two co-integration equations. These findings further confirm the reliability of the results produced from both the ARDL and Local projection models. The findings are displayed in the appendix. In addition, the residuals exhibit a normal distribution, as evidenced by the Jarque-Bera test and its related probability value, which exceeds the 5% significance level. The F-statistic and its associated probability value for the BG LM test and BPG test indicate the absence of both serial correlation and heteroscedasticity among the current and past values of the error components. In addition, the model is appropriately described based on the Ramsey test, as evidenced by the probability value of the F-statistic being higher than the 5% level of significance, as indicated in Table 4. Thus, we are unable to refute the null hypothesis that the model is accurately defined. Based on the CUSUM and CUSUM square shown in Figure 5 and Figure 6, it can be inferred that the model remains stable at a significance level of 5%.
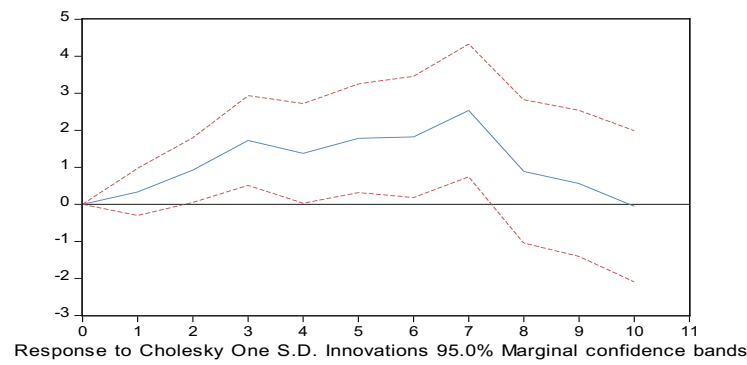
Response of ED to REM

Response of ED to RES

Response of ED to GCFG

Response of ED to GDPG
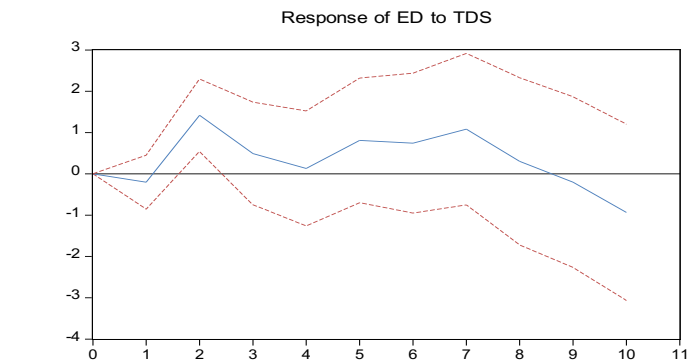
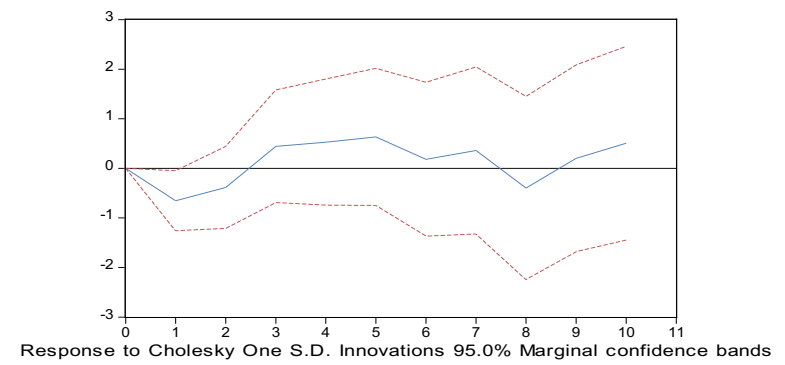Response of ED to TDS

Response of ED to TRDGDP
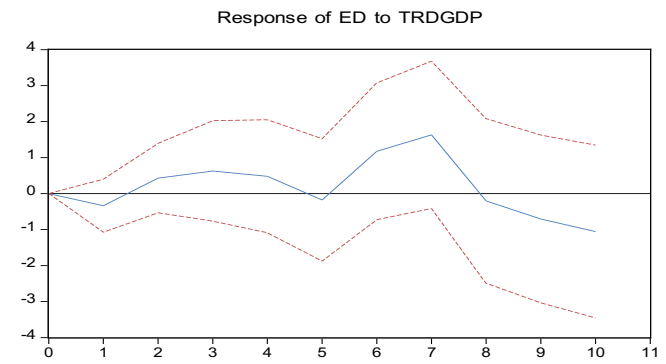
Figure 4: Local Projection Impulse Response Function

Table 4: Reliability and Validity Test

Statistic Test	JB- Statistic	Probability	F-Statistic	Probability
Normality JB	0.533148	0.765999		
Serial correlation BG LM			0.063252	0.8031
Heteroscedasticity BPG			1.304396	0.2617
Model specification Ramsey			1.057073	0.3121

Source: Calculated by the Author
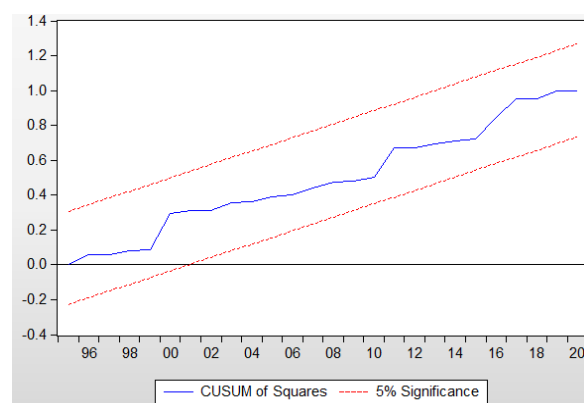
Figure. 5: CUSUM
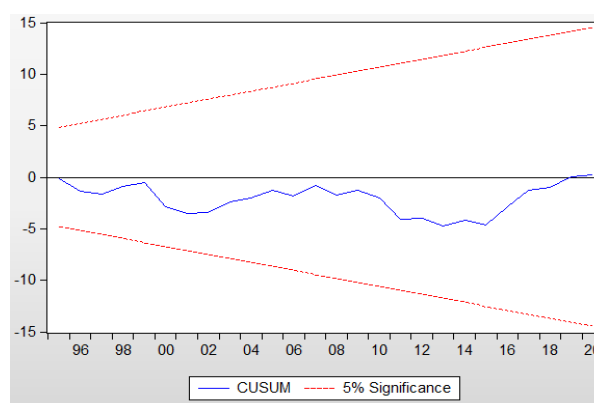
Figure. 6: CUSUM square

6. Policy Recommendation And Implication

The main objective of our study was to analyze the impacts of remittances and other macroeconomic variables on the external debt of Pakistan from 1976 to 2022. For this purpose, the data of the variables was obtained from the World Development Indicators database of the World Bank. Considering the unit root properties of the data, the analysis was first conducted using the Auto Regressive Distributed Lag (ARDL) bound test model developed by Pesaran et al. (2001) and the local projection impulse response function by Jordà (2005). It was found that there is long-run co-integration among the external debt, remittances, foreign reserves, gross capital formation, economic growth, external debt servicing, and trade openness. Remittances, gross capital formation, and external debt servicing positively and significantly affect the external debt of Pakistan. However, economic growth, foreign reserves, and trade openness have negative and significant effects on the external debt of Pakistan in the long run.

As for the short-run effects, the external debt of Pakistan is positively and significantly affected by gross capital formation and external debt servicing, while it is negatively and significantly affected by economic growth. The effects of foreign reserves and trade openness in the short run are also negative but statistically insignificant. The contemporaneous term (lag value of the dependent variable) is found to be positive and statistically significant. Moreover, the coefficient of the error correction term is negative and statistically highly significant. Additionally, the findings of the Local Projection IRF are similar to those of the ARDL, ensuring that the ARDL findings are more reliable, authentic, and robust.

Based on the research findings, it is recommended that the Government of Pakistan take effective measures to streamline the flow of remittances through proper and formal channels. To achieve this, the establishment of National Bank of Pakistan branches in key locations such as the Kingdom of Saudi Arabia, the United Arab Emirates, the United Kingdom, and the United States of America is suggested. Additionally, the introduction of new money transfer facilities, centres, and mobile applications is advised to facilitate cost-effective and efficient methods of transferring money from abroad to Pakistan. Incentive packages should also be implemented for foreign workers who use formal banking channels for money transfers. Furthermore, efforts should be made to eliminate the exchange rate disparity between the market and banking rates, and stringent measures should be taken to prevent the emergence of grey or black markets for money transfer and currency conversion.

Given that Pakistan has a labour-abundant population, with 65% being youth, and limited domestic job opportunities, the government should focus on developing skills and techniques among the youth that are highly sought after in the international labour market. Special emphasis should be placed on fostering ICT and artificial intelligence-related skills. Coordination between the Ministry of Labor and Foreign Affairs is essential to export these skilled workers at higher wages and under better terms and conditions of employment.

To alleviate the burden of external debt, the Pakistani government should strive to build foreign reserves through non-debt-creating inflows, such as remittances, exports, and foreign direct investment. Negotiations with external lenders for the rescheduling and temporary suspension of external debt servicing are recommended to achieve stability. Once financial stability is attained, the government can then begin the process of gradually reducing external debt liabilities. Control over imports is crucial for economic stability. The government should

restrict imports to essential products like oil and gas, raw materials, machinery, equipment, and tools. Imports of final luxury products should be temporarily banned until financial stability is restored.

Furthermore, there should be a concerted effort to enhance Pakistan's economic growth by investing in human capital formation and research and development. This investment will contribute to increased productivity of labour and capital, resulting in higher income levels and domestic savings. This, in turn, will stimulate higher investment through domestic resources, leading to a multiplier effect that generates more output, employment, and exports for the country.

7. Conclusions

Based on the outcomes of this study, it is deduced that remittances in Pakistan have been acknowledged and utilized as collateral and a complement for external borrowing, rather than as a substitute or alternative to foreign borrowing. Furthermore, foreign reserves in Pakistan have been strategically maintained for precautionary and transactional reasons, acting as a substitute for external borrowing. Moreover, gross capital formation, along with the servicing of external debt and the accumulation of past external debt, has been a significant factor contributing to the escalating external debt burden. Lenders have extended loans to Pakistan intending to recover previous dues, while Pakistan has been borrowing to meet its outstanding liabilities. Despite the essential roles played by trade, economic growth, and foreign reserves in mitigating the external debt burden, the magnitude of external debt servicing and other obligations has been so substantial that it has consistently exceeded the contributions of economic growth, exports, and foreign reserves. Non-debt-creating inflows like foreign direct investment have remained very limited and negligible due to the worsening energy crisis, law and order situation, and overall economic and political instability. Liberalizing current, capital, and financial accounts since 1988 on the recommendation of the IMF, World Trade Organization, and World Bank has resulted in a debt overhang problem in Pakistan for many years. Subsequently, the country has been ensnared in a vicious circle of foreign loans. Consequently, more than half of the government budget is allocated to debt servicing, leaving too few funds to meet the educational, health, environmental, and other socioeconomic needs. Growing poverty, inequality, unemployment, and inflation due to the massive depreciation of the currency have made common people's lives very miserable in every nook and cranny of the country.

8. Theoretical Implications, Limitations, and Recommendations

The findings of this study reveal that neo-liberalism theory is not appropriate and applicable for less developing and developing countries. However, dependency theory seems to be observed and at play in the case of developing countries, as foreign loans are being provided based on strategic location rather than economic viability. Pakistan was given a huge amount of foreign loans and aid due to its decision to participate in the Afghan war twice at the behest of the USA and NATO forces; first in 1979 and second in 2001.

8.1.1. Limitations

This study is conducted in the case of Pakistan, which is a severe debt distress country as declared by the World Bank and IMF recently despite being a top 5th remittance recipient country. Therefore, the findings of this study and recommendations cannot be generalized but can only be applied in similar types of countries like India, Bangladesh, the Philippines, Egypt, Mexico, etc.

8.1.2. Future Research Recommendation

A similar type of research can be conducted in other top remittance recipient countries one by one using time series data or jointly using panel data models. Besides, qualitative and primary data analysis is highly recommended.

Conflicts of interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT Author contribution statements: Author 1 contributed to the Conceptualization, Methodology, Formal Analysis Investigation, Writing – Original Draft, Visualization, Project Administration, and Writing – Review and editing. Authors 2 and 3 are supervising.

Data availability statement: Data is available at request. Please contact the corresponding author for any additional information on data access or usage.

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APPENDIX

Dependent Variable: TED_OF _GNI
Method: Fully Modified Least Squares (FMOLS)
Date: 06/16/24 Time: 23:26
Sample (adjusted): 1977 2022
Included observations: 46 after adjustments Cointegrating equation deterministics: C @TREND
Regressor equations estimated using differences
Long-run covariance estimate (Bartlett kernel, Integer Newey-West

automatic bandwidth = 5.0000, NW automatic lag length = 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REM GDP	-0.861916	0.239163	-3.603882	0.0009
RES_ED	-0.238456	0.067995	-3.506973	0.0012
GCF._GDP	-0.589805	0.452441	-1.303608	0.2002
GDP_GRO	-0.626169	0.24402	-2.566054	0.0144
TDS_GDP	3.416707	0.498352	6.856014	0
TRDGDP	-0.233084	0.161758	-1.440945	0.1578
C	65.23259	9.015861	7.235314	0
@TREND	-0.338082	0.055701	-6.069594	0
R-squared	0.858364	Mean dependent var		40.318
Adjusted R-squared	0.832273	S.D. dependent var		9.389
S.E. of regression	3.845236	Sum squared resid		561.86
Long-run variance	9.590875			
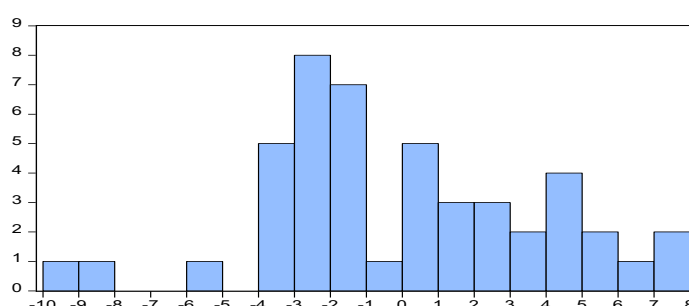
Series: Residuals
Sample 1977 2022
Observations 46

Mean	3.32e-15
Median	-0.942540
Maximum	7.539620
Minimum	-9.563932
Std. Dev.	3.857318
Skewness	0.021750
Kurtosis	2.745684
Jarque-Bera	0.127590
Probability	0.938197

Dependent Variable: TED_OF _GNI
Method: Dynamic Least Squares (DOLS)
Date: 06/16/24 Time: 23:49
Sample (adjusted): 1978 2021
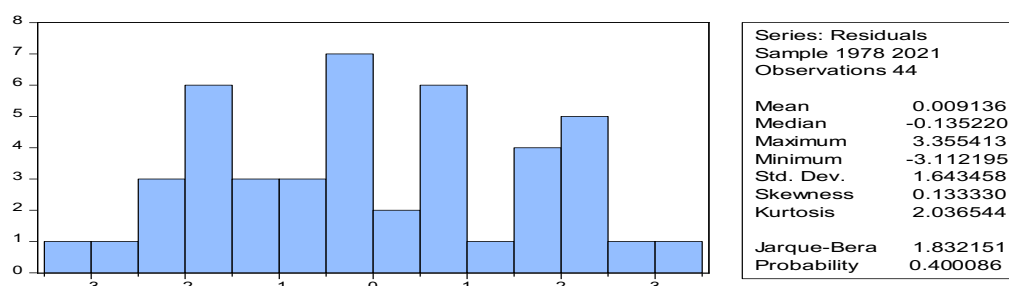Included observations: 44 after adjustments
No cointegrating equation deterministic
Fixed leads and lags specification (lead=1, lag=1)

White heteros kedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REM_GDP	-0.127459	0.401455	-0.317493	0.7542
RES ED	-0.572517	0.089648	-6.386307	0
GCF_GDP	3.099311	0.394806	7.850214	0
GDP GRO	-0.356393	0.750539	-0.47485	0.64
TDS GDP	1.668309	0.73506	2.269622	0.0344
TRDGDP	-0.268137	0.177781	-1.508247	0.1471
R-squared	0.969701	Mean dependent var		40.2019

		S.D. dependent var	
Adjusted R-squared	0.934856		9.441672
S.E. of regression	2.409821	Sum squared resid	116.14

Series: Residuals
Sample 1978 2021
Observations 44

Mean	0.009136
Median	-0.135220
Maximum	3.355413
Minimum	-3.112195
Std. Dev.	1.643458
Skewness	0.133330
Kurtosis	2.036544
Jarque-Bera	1.832151
Probability	0.400086

Date: 06/17/24 Time: 00:06
Sample (adjusted): 1978 2022
Included observations: 45 after adjustments
Trend assumption: No deterministic trend
Series: TED_ OF_GN| REM_GDP RES_ED GCF_GDP GDP_GRO TDS_GDP TRDGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.754528	166.939	111.7805	0
At most 1*	0.601819	103.7333	83.93712	0.0009
At most2*	0.407459	62.29513	60.06141	0.032
At most 3	0.306962	38.74507	40.17493	0.0692
At most 4	0.23478	22.24487	24.27596	0.0883
At most 5	0.189771	10.20323	12.3209	0.1104
At most 6	0.016168	0.733506	4.129906	0.45

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.754528	63.20575	42.77219	0.0001
At most 1 *	0.601819	41.43814	36.63019	0.0127
At most 2	0.407459	23.55006	30.43961	0.2813
At most 3	0.306962	16.5002	24.15921	0.3808
At most 4	0.23478	12.04164	17.7973	0.2962
At most 5	0.189771	9.469723	11.2248	0.1002
At most 6	0.016168	0.733506	4.129906	0.45

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values