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Empirical Analysis of the Impact of Quasi-Fiscal Activities in Pakistan's Electricity Sector on the Fiscal Deficit

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Abstract

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Keywords: Quasi-Fiscal Activities, Hidden Cost, Fiscal deficit of Pakistan, ARDL Test, State Owned Enterprises

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Title

Empirical Analysis of the Impact of Quasi-Fiscal Activities in Pakistan's Electricity Sector on the Fiscal Deficit

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Contents

Abstract

This study aims to empirically investigate the impact of quasi-fiscal activities in the electricity sector on Pakistan's fiscal deficit, using time series data from 1973 to 2022. The Bound and ARDL tests are employed to analyze the long-run cointegration among the variables. The results indicate that the variables are cointegrated in the long run and that the one-year lagged values of hidden costs and exchange rates significantly impact the fiscal deficit both in the long and short run. Trade openness has a statistically significant impact on the fiscal deficit in the long run but no significant impact in the short run. GDP does not show a statistically significant impact on the fiscal deficit in either the long or short run. The study suggests that the government should encourage the privatization of distribution companies (DISCOs), phase out untargeted subsidies, promote renewable energy, and maintain a stable exchange rate.

Keywords: Quasi-Fiscal Activities, Hidden Cost, Fiscal deficit of Pakistan, ARDL Test, State Owned Enterprises

Introduction

Fiscal deficit is a persistent issue in Pakistan's economy, with annual revenues consistently falling short of expenditures. Among the contributing factors are quasi-fiscal activities (QFAs) in the non-financial sector, particularly involving state-owned enterprises (SOEs). Intended to generate revenue for the government, SOEs often operate at continuous losses, reducing service quality and adversely impacting the economy. To address these issues, the government provides bailout packages or absorbs the debt through off-budget channels,

known as QFAs or hidden costs. These QFAs, especially in the electricity sector, have worsened Pakistan's fiscal deficit.

The Fiscal Risk Statement 2023-24 highlighted the vulnerability of the fiscal position to changes in key macroeconomic variables such as GDP growth, interest rates, inflation, trade openness, and exchange rates. Weak economic activity and a low tax-to-GDP ratio, which stood at 8.5 percent in FY 2023 (Pakistan Economic Survey 2023-24), have restricted additional revenue generation. Traditionally, non-developmental government expenditures and high subsidies have been blamed for budget deficits.

In developing countries, QFAs in the power sector are notably substantial compared to their industrial counterparts, sometimes surpassing conventional budget deficits (Kharas & Mishra, 2001). Over the past decade, electricity subsidies have cost the Government of Pakistan more than 2 percent of GDP at times, adding to the national debt and weakening the country's external position. This has led to a vicious cycle of debt, with a significant portion of the budget now allocated to debt interest and repayment, leaving fewer resources for developmental projects.

Quasi-fiscal Activities of the electricity sector of Pakistan arise from losses not covered by budgetary subsidies, reflecting prices below cost-recovery levels, bill collection inefficiency, and technical and financial inefficiencies (Bacon et al, 2010). These hidden deficits reduce investments necessary to expand services and delay essential maintenance, leading to service deterioration. As SOEs provide essential services, the government must divert scarce resources to bail them out, exacerbating fiscal constraints. According to Khan and Wahid (2023), the electricity sector's QFAs cost 5.1 percent of GDP in Pakistan. Similarly, Petri et al (2002) found that quasi-fiscal activities in the energy sector constituted 26.7 percent of Azerbaijan's GDP in 1999 and 6.5 percent of Ukraine's GDP in 2003.

In Pakistan, the issue of QFAs in the electricity sector has reached staggering figures in the billions of rupees, yet these losses are not reflected in the official budget deficit. This suggests the real budget deficit is much larger than officially reported, overlooking the actual financial challenges. This study aims to empirically determine the impact of QFAs on Pakistan's fiscal deficit, highlighting an often-ignored issue in fiscal deficit discourse.

The remainder of the paper is organized as follows: Section two reviews the literature, section three discusses data and methodology, section four presents results and discussion, and sections five and six provide the conclusion and recommendations.

Review of Literature

Fiscal deficit is a persistent issue for developing countries, including Pakistan. A considerable amount of literature exists on the causes, impacts, and determinants of fiscal deficit in both developed and developing nations. Many studies have explored the theoretical and empirical aspects of fiscal deficit. However, no study specifically examines the impact of the electricity sector's quasi-fiscal deficit/hidden costs on the fiscal deficit. There are, however, studies that investigate the effects of certain components of hidden costs, such as subsidies, on the fiscal deficit. Following is a brief review of the previous studies on the fiscal deficit

Kasongo (2023) explores the factors influencing South Africa's fiscal deficit from 1975 to 2021 using Bayesian vector autoregressive estimation. The analysis, conducted through impulse response functions and variance decomposition, identifies government debt, GDP growth, money supply, and interest rates as key determinants. Government debt positively impacts the fiscal deficit, while economic growth, money supply, and interest rates have negative impacts. Variance decomposition indicates that economic growth and national debt explain long-term variations in the fiscal deficit. Masheed et al. (2024) examined the impact of fiscal deficits on economic growth using data from Pakistan (1973-2022) and Afghanistan (2002- 2022), employing the ARDL model. The study found that fiscal deficits negatively affect GDP growth in Pakistan, while national debt has a similar adverse effect in Afghanistan. It recommends increasing government revenue to reduce fiscal deficits and debt. Both studies emphasize the importance of managing fiscal deficits and debt to promote economic growth.

Arif and Arif (2023) investigated factors influencing budget deficits in 66 countries from 1996 to 2020. She found that GDP per capita, inflation rates, and trade openness positively

impact long-term budget deficits. At the same time, Population growth rate and corruption have a negative impact on budget deficits. Political stability, improved bureaucratic quality, democratic accountability, and adherence to the rule of law reduce budget deficits. Mawejje and Odhiambo (2022) studied the causal connections between fiscal deficits and macroeconomic indicators in five East African Community countries. The study found long-term bidirectional causality between fiscal deficits and GDP growth, interest rates, grants, current account balance, inflation, and debt service. Short-term causality was only observed between fiscal deficits and GDP growth.

Mawejje and Odhiambo (2020) in their study titled "The Determinants of Fiscal Deficits: A Survey of Literature" reviewed both theoretical and empirical studies on the factors influencing fiscal deficits. They found that economic growth, trade openness, unemployment rates, urbanization, inflation, military spending, aid, political factors, and the quality of budgetary institutions are major determinants of fiscal deficits. Baum et al (2020) analyzed the management of fiscal risks associated with State-Owned Enterprises (SOEs). While SOEs are vital in key sectors and essential services, poor management can lead to economic disruptions and financial jeopardy for governments, often requiring bailouts. Even when less severe, underperforming SOEs can hinder productivity and economic growth, creating financial burdens through necessary support and reduced revenue. Additionally, poorly managed SOEs are less resilient to shocks, increasing fiscal risks for governments.

Subsidies and welfare analysis are extensively studied in various countries, including Pakistan. Awan et al (2019) conducted a study titled "Electricity Subsidies and Welfare Analysis in Pakistan," which employs the Computable General Equilibrium (CGE) technique in three simulations. The first simulation reveals that a 50% reduction in TDS does not significantly affect GDP and overall demand, but inversely impacts both private and public consumption. Furthermore, a 50% cut in government expenditures on subsidies decreases government spending, influencing private consumption due to the elevated cost of electricity, leading to increased prices across various commodities. The second simulation involves equivalent direct transfers to affected households, resulting in no significant macro-level changes. An analysis of government savings/deficit shows that reducing subsidies automatically decreases government spending, leading to a decreased deficit. This pattern persists in the last simulation, where improved efficiency in the electricity sector also aids in addressing the fiscal deficit issue.

Walker et al (2016) Prepared a comprehensive report on residential electricity subsidies in Pakistan. A qualitative study was conducted in the three provinces of Pakistan. The report stated that electricity subsidies in Pakistan cost 2 percent of the GDP. The untargeted residential subsidy is regressive in nature in Pakistan. According to the report targeting subsidies will improve the well-being of poor people save significant amounts of resources for social spending, and ease the burden of the fiscal budget. Yusoff et al (2017) also found similar results for Malaysia. Their overall findings suggest that eliminating fuel subsidies has notably boosted real GDP and decreased the government's fiscal deficit. Conversely, discontinuing the fuel subsidy has led to an increase in the prices of many local commodities, particularly those related to energy.

The empirical study conducted by Venkatraja (2016) titled "Impact of Central Explicit Subsidies on Fiscal Deficit in India" aims to examine the influence of explicit subsidies on the fiscal consolidation of the Central Government. He concluded that increasing subsidies not only puts the nation in a debt trap but also stagnates the capability of the manpower. He suggested targeted subsidies for poor people. In Kojima et al (2014) study, "Political Economy of Power Sector Subsidies: A Review with Reference to Sub-Saharan Africa," the focus is on reducing power sector subsidies that cause higher electricity costs. The research highlights that subsidy reduction requires not just price adjustments but also improvements in technical and business practices or changing power sources. Heavy reliance on subsidies can lead to substantial technical and non-technical losses.

Trimble et al (2011) Investigated, in the World Bank report, the tariff structure adjustment between 2008 and 2011 to analyze the benefit incidence for residential users in Pakistan. The study estimate showed that the top 20 percent of the richest people received 29 percent of subsidies

in 2011, which declined from 40 percent in 2008, but still the highest beneficiaries of the subsidies. The report states that in real terms the fiscal burden of subsidies has been reduced. According to the report, these improvements in subsidy are due to the reduction in international oil prices, which reduced the cost of production for electricity.

Ananda and Jha (2004) in their "Budgetary Subsidies and the Fiscal Deficit Case of Maharashtra" paper explore the disparities between the measurement of fiscal deficit and the calculation of aggregate subsidies in the Indian context. Subsidies impact the economy in undesirable ways, leading to inefficient resource allocation and potential injustices. The study argues that the subsidy, estimated as the unrecovered costs of the present consumption program, should not surpass the budgetary fiscal deficit.

In "Quasi-Fiscal Activities, Hidden Government Subsidies, and Fiscal Adjustment in Armenia," Lev Freinkman et al (2003) examines the impact of quasi-fiscal deficits and subsidies on Armenia's fiscal performance in the late 1990s. Using a flows-of-funds framework, the study finds that reducing quasi-fiscal deficits was key to fiscal adjustment. Although over 2% of GDP in annual quasi-fiscal subsidies benefited the population in the short, long-term effects included poor quality and shortages in energy and water, reducing living standards.

The novelty of this study lies in the introduction of quasi-fiscal activities/hidden costs of state-owned enterprises (SOEs) as determinants of fiscal deficits. A review of existing literature reveals a significant gap, as no studies have been found that specifically examine the impact of quasi-fiscal activities on fiscal deficits. This research aims to address this gap, potentially paving the way for future studies on the topic, and making a valuable contribution to the existing body of knowledge.

Methodology:

Theoretical Framework

Quasi-Fiscal Deficit (QFD) has an adverse impact on the macro-economy. It can destabilize the macroeconomic variables in different ways. When public sector entities accumulate losses, the government, in order to keep these running, provides bailout packages, which narrow down the fiscal space of the federal government. In developing countries budget resources at their disposal are limited, when more funds are allocated to finance the hidden cost/losses of the public sector entities, it implies either less allocation of resources to welfare and development expenditure or a high fiscal deficit. The provision of subsidies encourages wasteful consumption in some cases and in other cases provision of subsidies benefits the rich section more than the poor people of the society. It diverts resources from most efficient use to less efficient use. In developing countries, high public expenditure gives rise to fiscal deficit (Bacon et al, 2010).

Quasi-fiscal activities in the electricity sector, such as subsidies or below-cost tariffs, can contribute to fiscal deficits by reducing revenue collection or increasing government spending. The relationship between electricity sector quasi-fiscal activities and fiscal deficit can be understood through the lens of public choice theory, which suggests that government intervention in markets is often driven by political considerations rather than economic efficiency.

The study modeled the fiscal deficit of Pakistan in terms of GDP, exchange rate, trade openness, and hidden costs. Hidden cost has a direct effect on government fiscal deficit (Saavalainen and Ten Berge, 2006, Ebinger, 2006). The inefficiencies and losses within the electricity sector contribute to the accumulation of hidden costs, thereby exacerbating the fiscal deficit. Thus, it is hypothesized that an increase in hidden costs will lead to a corresponding rise in fiscal deficit.

Trade openness helps in transferring new ideas, and technology, which helps in increasing output level in the country, and hence reduces fiscal deficits (Kwakwa and Alhassan, 2017). Increased trade openness may enhance export earnings, thereby augmenting government revenues and reducing fiscal deficit. Conversely, increased import competition may exert downward pressure on domestic industries, leading to decreased revenue collection and potentially widening fiscal deficits.

GDP, representing the aggregate economic output of a country, plays a pivotal role in influencing fiscal dynamics. Economic growth stimulates government revenues through increased tax collection and fosters fiscal discipline by expanding the tax base. While economic downturns can strain government finances by

reducing revenue streams. Therefore, it is anticipated that higher GDP growth will be associated with a decrease in fiscal deficit, while lower GDP growth may lead to an increase in fiscal imbalances.

The exchange rate, reflecting the value of the domestic currency relative to foreign currencies, is another determinant of fiscal deficit. Exchange rate fluctuations impact government finances through their effects on trade balances, debt servicing costs, and capital inflows. It is posited that exchange rate depreciation will be positively associated with the fiscal deficit, while exchange rate appreciation will be negatively associated with the fiscal deficit.

Model of the Study

This study investigates the impact of hidden cost, GDP, trade openness, and exchange rate on the fiscal deficit of Pakistan. The following functional forms of the variables will be investigated.

FISCAL DEFICIT = GDP +HIDDEN COST +TRADE OPENNESS + EXCHANGE RATE

In mathematical form

$$FDG = \beta_0 + \beta_1 GGDP + \beta_2 HCG + \beta_3 TOG + \beta_3 EXR + \nu$$

This study employed time series data from 1973-2022. The data for each variable is presented in annual frequency. For the purpose of analysis, all the variables are chosen as a percentage of the GDP of Pakistan, except the exchange rate of Pakistan, which is measured as Rs/Dollar.

Table 1

Description of variables and data source

Variable Name	Description	Source
FDG	Fiscal deficit as a percentage of GDP	Economic Survey of Pakistan
GGDP	The growth rate of Gross Domestic Product (at a constant price of 2015 base year)	State Bank of Pakistan
HCG	Hidden Cost (percentage of GDP)	Authors own Calculation (Using Hidden Cost Calculator)
TOG	Trade Openness (percentage of GDP)	Economics survey of Pakistan
Exr	Exchange rate (Rs/Dollars)	Economics survey of Pakistan

Analytical Frame Work

The Autoregressive Distributed Lag (ARDL) approach, pioneered by (Pesaran, Shin, & Smith, 2001), is utilized to empirically investigate the connection between fiscal deficit and hidden costs alongside other key variables in this research. ARDL model is an alternative cointegration technique. It is argued that the ARDL approach offers several advantages compared to traditional cointegration techniques. One advantage is its applicability to various types of data series regardless of their integration levels. This eliminates the need for preliminary tests associated with standard cointegration, which require variables to be already classified as I(1) or I(0). Another benefit is that the model incorporates sufficient lags to capture the data-generating process within a general-to-specific modeling framework (Laurenceson & Chai, 2003). Consequently, this mitigates endogeneity issues in the models since both dependent and independent variables can be introduced with appropriate lags. Additionally, the ARDL approach allows for the possibility that different variables may have varying optimal lag lengths, which is not feasible in Johansen-type models.

An Error Correction Model (ECM) will be utilized to obtain the short-run dynamics parameters. An ECM has two important parts. First, the estimated short-run coefficients and second, the error correction term(ECT) which provides the speed of adjustment whereby short-run dynamics converge to the long-run equilibrium path in our model.

Results and Discussion:

Unit Root Test

The Augmented Dickey-Fuller (ADF) test was

utilized to assess the stationarity levels of the target variables. Table 2 presents the results, indicating that FDG and GGDP, expressed as percentages of Pakistan's GDP, exhibit stationarity at the 5% significance level. These variables are integrated of zero order I(0). Conversely, HCG, Exr, and TOG are non-stationary at the level, becoming stationary at the first difference at a 5% significance level. This implies an integration order of one I (1) for these series.

The ADF results reveal varying orders of integration among the variables, with no variable identified as having an integration order of I(2). Consequently, ARDL and bound tests are deemed appropriate for investigating long-run cointegration among the variables.

Table 2

ADF Unit Root Test

Variables	Test Statistics	Probability	Lag	5% Critical value	Intercept/trend	Order
FDG	-3.62*	0.00	0	-2.92	constant	I(0)
GGDP	-5.12*	0.00	10	-2.92	Constant	I(0)
HCG	-6.47*	0.00	8	-3.52	Intercept and Trend	1(1)
TOG	-7.35*	0.00	10	-3.51	Intercept and trend	I(1)
Exr	-4,17*	0.00	10	-1.95	None	1(1)

Source: Author's own estimation

ARDL TEST

The outcomes of the ARDL approach can be divided into three main sections: the Bounds test approach to cointegration, findings related to the estimated long-run coefficients, and the short-run dynamics along with the Error Correction Term (ECT) of the ARDL model. Additionally, the selection of lag length is a crucial aspect in estimating ARDL results. In this study, the AIC automatic criteria selection method was employed for lag length determination. As per the automatic lag selection based on the annual sample data, the chosen lag limit for the maximum dependent and dynamic regressors is 5 lags.

Table 3

Result of Bound Test

F-Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Signif.	I (0)	I (1)
		Asymptotic: n=1000		
F-statistic	4.444806			
		10%	2.2	3.09
		5%	2.56	3.49
K	4	2.5%	2.88	3.87
		1%	3.29	4.37

Author's own estimation using E-View 10

The Bound test is employed to demonstrate the presence of cointegration among the model variables. The null hypothesis posits no cointegration among the variables, while the alternative hypothesis suggests cointegration among the variables of interest. If the F-statistic exceeds the upper bound values, we reject the null hypothesis of no cointegration and accept the alternative hypothesis. Conversely, if the F-statistic is below the lower bound value, we cannot reject the null hypothesis of no cointegration.

In this study, the F-statistic has a value of 4.44, surpassing the upper bound test value of 3.49 at a 5% significance level. This implies the existence of

long-run cointegration among the variables see Table 3.

Table 4

ARDL Long Run Coefficients

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GGDP	-0.084120	0.119727	-0.702594	0.4891
HCG(-1)	3.253809	0.786534	4.136897	0.0004
TOG	0.193620	0.061828	3.131568	0.0045
EXR	-0.154490	0.024598	-6.280638	0.0000
C	9.230842	0.853000	10.82162	0.0000

Source: Author's Own Estimation using E-View 10

The estimated long-run coefficients are presented in Table 4. The elasticities of these coefficients indicate statistically significant relationships with fiscal deficit at a 5% significance level, except for GGDP, which has a negative but statistically insignificant coefficient. Notably, Hidden Cost (HCG(-1)) demonstrates a positive impact with a one-year lag, suggesting that the hidden cost in the previous period positively affects the fiscal deficit in the current year. Trimble et al (2011) highlight that the augmentation of subsidies in Pakistan contributes to an escalation in fiscal burdens, while their reduction alleviates the fiscal burden.

Several factors contribute to this lagged impact of hidden costs on fiscal deficit. For instance, the Government of Pakistan allocates a budget for electricity subsidies in the current year, but the allocated budget often falls short of actual subsidies, negatively impacting the upcoming budget. Similarly, enterprises (SOE) may delay necessary repairs and maintenance of capital in the current year, requiring the government to address these issues in the coming year's budget. Public enterprises accumulate hidden costs until they become unbearable, at which point they shift the costs to the federal government. Therefore, higher hidden costs in a given year correspond to higher fiscal deficits in preceding years. A study (Jha et al., 2009) further affirmed that oil subsidies directly contribute to fiscal costs. Countries that provide direct subsidies for gasoline, diesel, and kerosene appear to generally experience high fiscal deficits.

Trade openness has a positive impact on the fiscal deficit with a magnitude of 0.1936. Historically, Pakistan's imports have exceeded exports, making it a trade deficit country. Increased trade widens its fiscal deficit. Arif and Arif (2023) in a study also concluded that trade openness has a positive and significant long-run impact on fiscal deficit. Additionally, the exchange rate and fiscal deficit of Pakistan are negatively related. When the exchange rate depreciates, economic theory suggests that the country's exports become more competitive, leading to an improvement in the balance of trade and, consequently, an enhancement of the fiscal position of the country.

Short Run Analysis

Table 5

Result of ECM

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (FDG (-1))	0.362823	0.178921	2.027844	0.0538
D (FDG (-2))	0.438095	0.158067	2.771577	0.0106
D (FDG (-3))	0.222606	0.160858	1.383864	0.1791
D (FDG (-4))	0.268034	0.139845	1.916648	0.0673

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (HCG (-1))	0.335194	0.573191	0.584786	0.5641
D (HCG (-2))	-1.835643	0.626950	-2.927892	0.0074
D (HCG (-3))	-3.573919	0.713316	-5.010289	0.0000
D (HCG (-4))	-2.109526	0.664935	-3.172530	0.0041
D (HCG (-5))	-1.214254	0.617090	-1.967711	0.0608
D (EXR)	-0.034715	0.032109	-1.081173	0.2904
D (EXR (-1))	0.173303	0.041353	4.190805	0.0003
D (EXR (-2))	0.121932	0.039187	3.111559	0.0048
D (EXR (-3))	0.102704	0.038237	2.686031	0.0129
D (EXR (-4))	0.146232	0.046362	3.154112	0.0043
CointEq (-1)*	-0.692744	0.119199	-5.811637	0.0000

Source: Author's Own Estimation Using E-View 10

During the study period, the equilibrium correction coefficient stands at -0.69, displaying both negativity and statistical significance at the 1% level. The substantial magnitude of this coefficient suggests a rapid adjustment of short-run disequilibrium towards long-run equilibrium.

The findings in Table 5 further solidify the short-term impact of hidden costs and exchange rates on the fiscal deficit, both of which are significant at the 5% level. The statistical significance of hidden costs at lag 2 and lag 3 is noteworthy, with their short-term coefficients demonstrating significance and progressively increasing in value. Despite a reduction in coefficients at lag 4 and 5, statistical significance persists. A similar short-run impact of the exchange rate on fiscal deficit is observed. This pattern mirrors the impact of hidden costs and exchange rates on the fiscal deficit.

Conversely, no short-term impact is observed for GDP and TOG on the fiscal deficit. Additionally, the lagged values of the dependent variable prove insignificant across all lags considered in the analysis. With an R-squared value of 67%, indicating a well-fitted model, these findings collectively contribute to a comprehensive understanding of the dynamics at play in the study.

Wald Test

Table 6

Result of Wald TestSource: Author's Own Estimation Using E-View 10

Variable	Null Hypothesis	Test Statistic	Value	Prob.
Fiscal Deficit	C (1) = C (2) = C (3) = C (4) = 0	F-statistic	0.558621	0.6948
		Chi-square	2.234485	0.6927
Hidden Cost	C (5) = C (6) = C (7) = C (8) = C (9) =0	F-statistic	2.184179	0.0896
		Chi-square	10.92090	0.0530
Exchange Rate	C(10)=C(11)=C(12)=C(13)=C(14)= 0	F-statistic	5.555368	0.0015
		Chi-square	27.77684	0.0000

The results of the Wald test further validate the assertion that the combined effect of FDG and Exr is statistically insignificant. Conversely, it highlights the significant short-term impact of hidden costs and exchange rates on the fiscal deficit. This underscores the importance of considering not only individual factors but also their collective influence, as the joint impact of FDG is found to lack statistical significance, while hidden costs and exchange rates demonstrate notable

effects on the fiscal deficit in the short run.

Diagnostic Test

The stability tests, employing CUSUM and CUSUM Square, aim to assess the stability of both long-run and short-run constraints. These tests rely on the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) procedures proposed by Borensztein et al. (1998). This methodology has also been employed by M. H. Pesaran and Pesaran (1997), Suleiman (2005), and Tiwari and Shahbaz (2013) to examine the stability of long-run coefficients. In Figures 1 and 2, the CUSUM and CUSUMSQ statistics are presented. The plot in the figure demonstrates that both CUSUM and CUSUMSQ remain within the critical 5 percent bounds, confirming the existence of long-run relationships among variables. This observation indicates the stability of coefficients throughout the sample period.

Figure 1

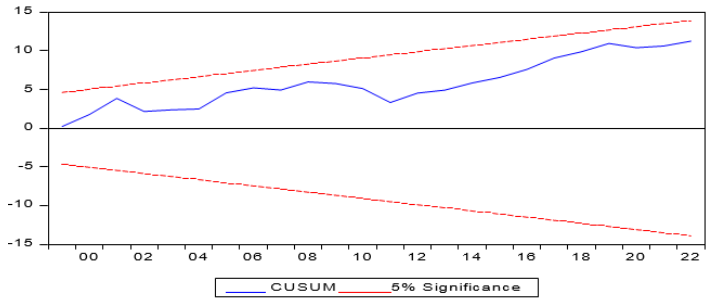
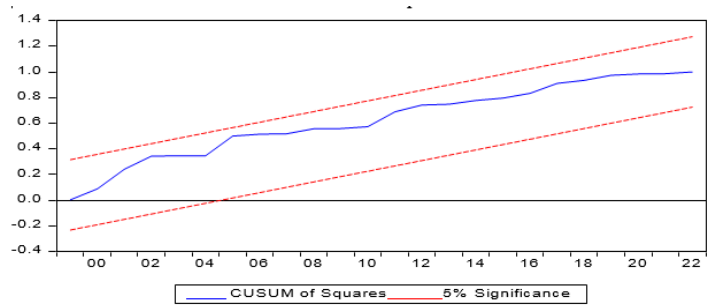


Figure 2

CUSUM of Square Test



The Serial Correlation Test is conducted to determine whether a series exhibits serial correlation. The Breusch- Godfrey Serial Correlation LM test is employed for this purpose, with the null hypothesis (Ho) stating that there is no serial correlation, and the alternative hypothesis (H1) suggesting the presence of serial correlation. The results, as indicated by the F-statistic and Chi-Square probabilities, are 96% and 92%, respectively. These values imply that the null hypothesis is not rejected; rather, it is accepted, indicating the absence of serial correlation.

Moreover, the null hypotheses of the normality test and Heteroskedasticity test remain unchallenged. Consequently, it is affirmed that the series are normally distributed and exhibit no heteroskedasticity.

Breusch-Godfrey Serial Correlation LM Test:

Table 7

Result of Serial Correlation LM Test

F-statistic	0.038361	Prob. F(2,22)	0.9624
Obs*R-squared	0.152913	Prob. Chi-Square(2)	0.9264

Source: Author's own estimation using E-View 10

Normality Test

Figure 3

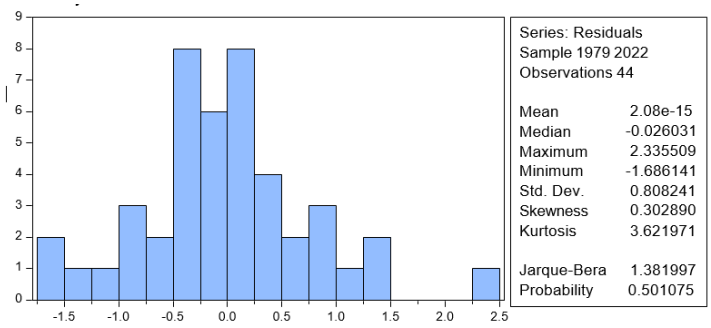


Table 8

Result of Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.487048	Prob. F(19,24)	0.9432
Obs*R-squared	12.24434	Prob. Chi-Square(19)	0.8749
Scaled explained SS	4.775847	Prob. Chi-Square(19)	0.9996

Source: Author's Own Calculation Using E-View 10

Conclusion

This study aims to ascertain the long-run relationship of fiscal deficit with its various determinants, namely: hidden cost, GDP, exchange rate, and trade openness at the aggregate level. The analysis is conducted within a multivariate cointegration framework. The ADF test reveals different orders of integration for variables; therefore, ARDL and the Bound test are chosen for analysis. The Bound test indicates the existence of long-run cointegration among the variables. Different diagnostic tests have been used to check the reliability of the model. The results indicate that the model's coefficients remain stable over time, there is no serial correlation in the series, and the series shows a normal distribution without any signs of heteroskedasticity.

Over the short and long term, the study discloses notable connections between the fiscal deficit and its influencing factors. The lagged values of hidden costs exert influences on the fiscal deficit in both the long run and short run. The coefficient of Hidden Cost exceeds one, suggesting a high responsiveness of the fiscal deficit to it. Similarly, the exchange rate has a statistically significant direct impact both in the short as well as long term on fiscal deficit. Trade openness exerts a direct influence on the fiscal deficit in the long run, reflecting the persistent trade imbalance in Pakistan, but does not affect the fiscal deficit in the short run. Regarding GDP, it does not show statistically significant impacts on the fiscal deficit, neither in the long term nor in the short term. Any disruptions in the short-term equilibrium are rectified by the presence of hidden costs and the exchange rate.

Recommendations

Based on the analysis and conclusions of the study, the following policy recommendations are proposed to address the hidden costs and associated issues:

- The government should privatize the distribution companies. Privatization would help tackle problems such as electricity theft and bill recovery challenges. It would also improve the quality of electricity services and reduce the financial burden on the government. Implementing regulatory frameworks is crucial for ensuring a smooth transition.
- The government should gradually phase out untargeted consumer subsidies. Removing

untargeted subsidies will lessen the government's financial strain. Instead, subsidies should be targeted to benefit those who genuinely need them. These individuals can be identified and given direct cash assistance to help cover high electricity prices.

- One major cause of high hidden costs in the electricity sector is an inefficient energy mix. Reducing the share of thermal sources in total electricity production and increasing the use of renewable energy can help lower these hidden costs. This involves investing in renewable energy infrastructure and providing incentives for renewable energy projects.
- Exchange rate devaluation affects the fiscal deficit in two ways: it directly increases debt in dollar terms and raises the cost of imported furnace oil, which in turn increases the cost of electricity production from thermal sources. The government should aim to maintain a stable exchange rate in the long run. Implementing effective monetary policies and negotiating international trade agreements can help achieve this stability.

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