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Effect of External Debt Services on Economic Growth: An Empirical Evidence from Pakistan

Amjad Ali Khan[a], Dr. Sabahat Subhan[b], Dr. Amtul Hafeez Gondal[c]

[a]PhD Scholar, Department of Economics, National University of Modern Languages, Islamabad.
[b,c]Assistant Professor, Department of Economics, National University of Modern Languages, Islamabad.

[*]**Email:** amjadmdnpk@gmail.com

***Abstract*:** The current study pursues to examine the impact of external debt servicing on the economic growth of Pakistan, spanning on the period from 1980 to 2022 (years). Time series data required for the study were sourced from the state Bank of Pakistan-SBP and world Development Indicators-WDI. To analyze the long and short term association of the variables GDP growth and external debt servicing, by applying the methodologies of Johansen Co-integration and Vector Error Correction Model (VECM). The econometrics findings approve the expected presence of the long run relationship among the variables, and revealing a negative association of external debt services, Interest rate with GDP growth. It indicates a potential debt-trap situation. Evidently, there is positive association between external debt servicing and gross domestic production in the short run, imputable to the injection of external debt into the economy. This incursion leads to increased investments, heightened economic activities, and a transient boost in GDP. The conflicting results between short and long-term perspectives emphasize the necessity for devising of policy for the policy makers.

Keywords: Gross Domestic Production Growth, External Debt Servicing, Rate of Interest, Policymakers.

1. Introduction

The global economy is driven by the aspiration to maximize production through the efficient utilization of limited resources. These resources, including land, labor, capital, and entrepreneurial skills, are dispersed worldwide. Worldwide economists are diligently working to optimize resources usage to enhance the production level. While land remains a fixed resource, the other three factors are transferrable and can be sourced for economic activities from the rest of the world. Nations strive to address resource deficiencies and activate dormant resources to propel economic momentum. This necessitates to acquire external resources. Presently, every economy requires external resources for investment. The countries like United States, Britain, Japan, Belgium, Luxembourg and Brazil, depend directly or indirectly on external resources to boost economic activities therefore, having higher volume of external debt. For instance, the United States and Britain are notable borrowers, with the former acquiring approximately $134 trillion in debt, while the latter has accrued $90 trillion. The magnitude of these loans significantly impacts their respective economies, with Britain's debt representing around 416% of its total GDP (Express, NEWS report, Pakistan). The aim of the current study is to assess whether Pakistan's external debt servicing obligations pose a threat to its economy and whether it has the capacity to service its accumulated debt in the future. Pakistan is grappling with severe debt challenges, prompting an urgent need for a

comprehensive analysis and strategic solutions. The overlapping generations model provides insights into the detrimental effects of high debt levels, hindering growth, variation in market expectation, constraint growth expansion, create uncertain interest rate. Combine these factors create a burgeoning situation towards unsuitable productions.

1.2 Brief History of Pakistan External Debt

Pakistan met substantial economic, social, and structural challenges at the time of its inception, necessitating external resources for development of the country. Until 1988, in spite of an annual GDP growth of 6.6%, external debt soared to US $20 billion, it brought an 8% annual monetary deficit, intensifying the situation. By 1999, the debt had risen to US $33.60 billion, reaching US $40.5 billion in 2007 and staggered to US $60.1 billion in 2011, comprising 28.5% of the GDP. In the regime of PPP 103% new debt was added which mounted the external debt and liabilities up to US $65.5 billion in 2012, equivalent to 30.2% of the GDP. To certify fiscal discipline, Pakistan ratified the Fiscal Responsibility and Debt Limitation Act (FRDL) in June 2005, capping the government debt-to-GDP ratio up to 60%. The prime cause of the surge in external debt in Pakistan is the twin deficit (fiscal and current account deficits). Government revenue constantly fell short of expenditures, that resulted increased in external debt liabilities, which expand the debt servicing. The year 2014 experienced 6.85% increase, bringing the external debt to the tune of $ 64.20 billion. This figure illustrates the dynamic nature of Pakistan's external debt, with periods of growth and occasional declines over the specified time frame.

In 2015, the external debt stood to $ 68.6 Billion, experiencing 6.87% increase in 2016, and reached to $75.05 billion. This trend continued with a significant 22.13% increase in 2017, bringing the debt to $ 91.66 billion. In the year 2018 the debt burden plunged to $ 99.22 billion (8.25% increase), followed by $107.88 billion in 2019 (8.73% increase), and $115.69 billion in 2020 (7.24% increase). The most current data for 2021 indicates a further increase of $130.43 billion, that reflects a 12.74% rise. Figure-1 highlight a consistent upward trajectory in Pakistan's external debt over the study period from 1980 to 2022.

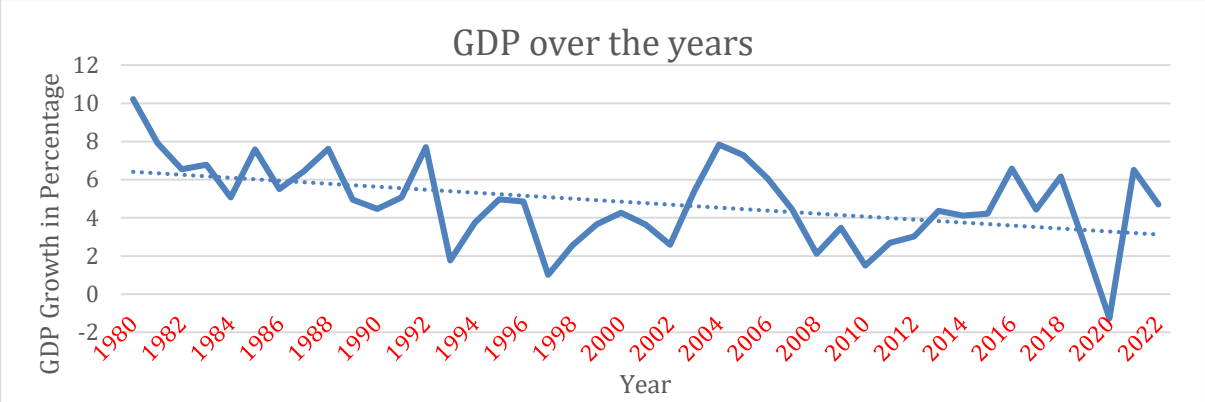
Figure 1: External Debt Trend of Pakistan

Ref: https://www.macrotrends.net/countries/PAK/pakistan/external-debt-stock

Relying solely on debt is not the solution to issues facing by the Pakistan economy. The policy makers should take inventively foresighted measures to uplift the facing situation. Pakistan's external debt situation has been a become a serious concern in recent year. The debt to gross domestic production ration has been touched 75% in 20222. This high level of foreign debt curtails the growth of the country, as debt servicing can divert resources away from productive investment and towards debt repayment. This can lead to reduced investment in critical sectors such as infrastructure, health, and education, which can further harm the economy. Studies have found that debt servicing has a harmful effect on Pakistan's economic expansion. Debt servicing diverts resources away from productive investment, reducing the availability of capital for businesses and households. This can lead to reduced investment in critical sectors such as infrastructure, health, and education, which can further harm economic growth. Additionally, external debt can discourage investment and increase capital flight, further

exacerbating the negative impact on economic growth. The graph in the figure-2 shows the trend of GDP growth, which is declining year on year basis and even become negative in the financial year 2020.

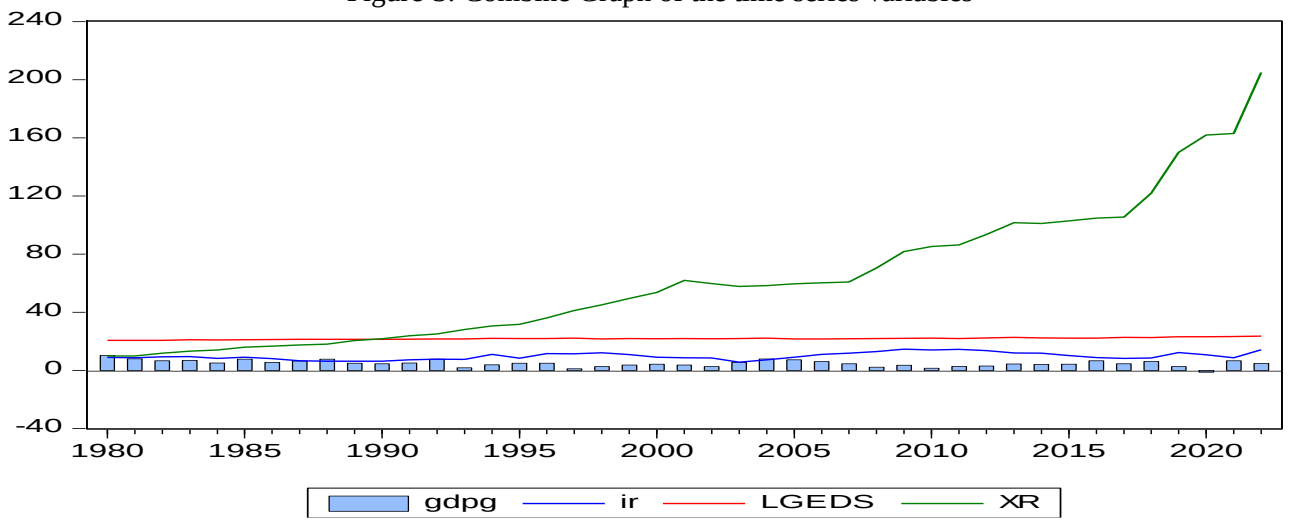
Figure 2: Graph of GDP Growth of Pakistan during the study period.



Source: Researcher's computation basing WDI's data.

The graph in the figure-3 shows the combine trend of the variable of the series used in the ongoing studies i.e. gdpg is the growth for Gross Domestic Production, LGEDS represent external debt servicing variable, ir represent interest rate and XR represent the variable for exchange rate starting from the year 1980 to 2022. The exchange rate showing an exponential trend due to multiple time depreciation in the Pakistani currency.

Figure-3: Combine Graph of the time series variables



Source: Researcher's computation in E-Views.

2. Literature Review

2.1 External debt and Economic Growth

The overhang situation of debt is affective in the eighty highly indebted poor countries of the world through applying of the augmented slow growth model by Cordella et al. (2005). Patenio and Tan Cruz (2007) studied, the correlation between external debt servicing and growth of the economy of Philippines. He used Using quarterly data and the vector autoregressive representation model (VARM), they analyzed variables like capital stock, labor force, and human capital. Their findings suggest that, over the examined period, external debt servicing didn't significantly affect the country's economic growth. Sen et al. (2007), analyzed the same effect in the Latin American and Asian countries. identifying its existence in both but noting its moderation in Asian nations compared to Latin America.

Chaudhry et al. (2009) examined that Pakistan's savings and investment expenditures are affected by foreign debt and its payment between 1973 and 2006.

Hwang et al. (2010) expanded his studies on the same regions, confirming debt overhang situation by investigating the synthesis crowding out effect of debt. Zafar et al. (2015) applied the neo-classical augmented model of growth, revealing external debt as a key determinant dampening economic growth. The debt-growth dilemma in India, examined by Farhani (2016). Daka et al. (2017) provided varied conclusions, with foreign debt acting as an inspiring factor in some cases and having crowding-out effects in others. Fosu (2011) confirmed debt overhang in Sub Saharan African countries. Ndubuisi (2017) rejected the debt overhang hypothesis for Nigeria, while Kharusi and Ada (2018) and Senadza et al. (2018), explore external debt worsening growth in the long run. Zaman and Arslan (2014) explored the relationship between foreign debt and GDP, highlighting a positive relationship but warning about repayment issues.

Asghar (2016) suggested expanding GDP through production networks and infrastructure development to manage the positive and negative impacts of foreign debts on Pakistan. Hussain and Shirin (2016) found external debts worsening the relationship with economic growth in developing economies. Hussain et al. (2016) recommended increasing and diversifying exports and improving trade openness to stabilize and grow economies instead of relying on external debt. Daka et al. (2017) disagreed on the time period, noting the debt overhang effect's impact on long-run growth and the crowding-out effect's short-term effectiveness, suggesting external borrowing may lead to debt crowding-in during long periods. Awan and Aslam (2017) advised Pakistan to reduce dependence on external debts through independence in its economic and foreign policies

2.2 Exchange Rates and Economic Growth

Ahmad, et al. (2013) investigated in their studies by examining the relationship between gross domestic production, exchange rate, foreign direct investment and capital stock. Their finding was, that inflation rate, and exchange rate, have a negative and significant effect, on the economic growth of Pakistan.

Mehndi et a., (2014) examined a negative effect keeping in view the rate of development of financial market effected by economic growth and exchange rate fluctuations in the growing

(Asian Economic and Financial Review, 2014, 4(4): 517-528). Zainab J. & Iffat R. (2020) find out that exchange rate policy and financial development are interconnected with economic growth, particularly in developing countries like Pakistan. It proposes that maintaining an exchange rate closer to equilibrium can lead to higher per capita growth. Levine, (1997) highlights the importance of financial development, not only for economic growth, but also for concentrate capital and driving technological advancements. In crux, the findings put stress that exchange rate policies have the pivotal factor in boosting economic growth within developing economies. Muhammad and Abdullah's (2020) examines a negative long run relationship amid to external debt servicing impact on Nigeria's economy using a time-series variables from 1985-2018.

2.3 Interest Rates and Economic Growth

According to Sachs, (1989), that higher debt servicing increase interest on bills that resulted in widening budget deficit, and disturbs government spending Higher interest rate may also positively impact in the long-run, which can increase capital inflow within the economy, having benefit for the home country. The high interest rate will have an attraction for the investors, resultantly capital accumulation will have to be enhanced. Henceforth, both positive and negative relationship among interest rate and production is expected in the short as well as in the long run.

2.4 Literature Review Specific to Pakistan

Sabahat and Butt (2008): Using time series data covering 36 years from 1972 to 2007, they investigated the relationship between trade liberalization and the amount of external debt incurred. Sharif et al. (2009): Examined how Pakistan's savings and investment expenditures were affected by foreign debt and its payment between 1973 and 2006. Awan et al. (2011): Using data from 1974 to 2008, they investigated the connections between exchange rates, fiscal policy deficits, and deteriorating terms of trade and foreign debt. Safia and Shabbir (2009): From 1976 to 2003, they looked at how external debt affected economic growth in twenty-four developing nations. Jafri (2010): Using data from 1978 to 2009, he investigated how servicing external debt affected total investment in Pakistan's economy. Hansen (2002): Quantified the effects of debt service payments and assistance flows across nations in order to evaluate the influence of aid and external debt on the investment and growth of Highly Indebted Poor nations (HIPCs). Gohar et al (2009) examined the effects of paying off external debt on

the development and growth of 36 low-income nations between 1990 and 2008. Akram (2010) used data from 1972 to 2009 to examine the effect of Pakistan's public debt on the country's economic growth. Moreover, Asghar (2016) suggested expanding GDP through production networks and infrastructure development to manage the positive and negative impacts of foreign debts on Pakistan. Hussain et al. (2016) recommended increasing and branching out exports and improving trade openness to strengthen and grow economies rather relying on external debt. Awan & Qasim (2020) found that external debt growth rate negatively affects GDP growth, and discoursed for the steady steps to reduce the debt burden.

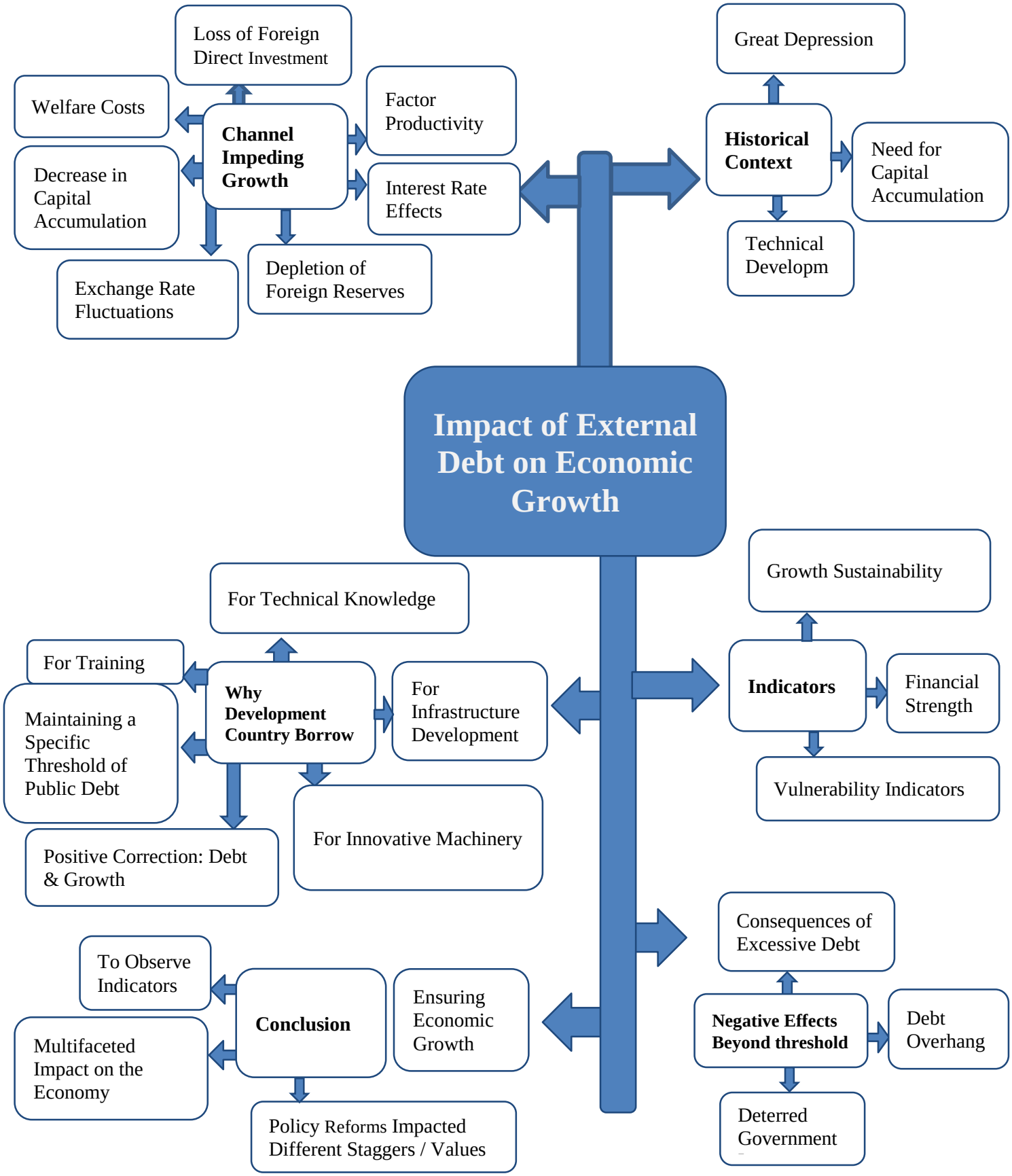
3 Methodology

3.1 Channels through Which External Debt Services Affect Economic Growth

In the aftermath of the 1930 Great Depression, a window of economic progress opened, prompting less developed countries to recognize the importance of technological development to harness their natural resources. The equation was clear—no savings meant no investment, and no investment perpetuated economic weakness. Employing growth models like the Harrod-Domar and Lewis Structural Change (dual-sector), Pakistan sought to amplify production by injecting capital into the economy through debt, creating a cycle of production functions.

Since the 1990s, policymakers and economists have expressed serious concerns, observing that high levels of indebtedness in developing countries curtail growth and development. Rigorous research has consistently demonstrated a positive correlation between debt and economic growth, albeit up to a certain threshold, beyond which the correlation turns negative (refer to, for instance, Pattillo et al., 2002). In today's rapidly evolving world, countries endowed with abundant natural resources find themselves unable to harness these resources without external debt. External assistance, in the form of machinery, technical knowledge/support, training, and infrastructure development, becomes indispensable for these developing countries. The challenge lies not in taking on debt but in managing its repayment to creditors, as it significantly impacts a country's investment, subsequently affecting its gross domestic product.

This analysis or research on external debt sustainability in developing countries becomes crucial, as it inculcate various hindrance to hamper productions. Key considerations include the long-term impact on a country's development and how future economic prospects might be influenced by indebtedness, affecting diverse sources and factors of growth. The diagram below explained the channel through which the external debt affects the economic indicators.


Impact of External Debt on Economic Growth
Channel Impeding Growth
Loss of Foreign Direct Investment
Welfare Costs
Factor Productivity
Decrease in Capital Accumulation
Interest Rate Effects
Exchange Rate Fluctuations
Depletion of Foreign Reserves
Historical Context
Great Depression
Need for Capital Accumulation
Technical Developm
Why Development Country Borrow
For Technical Knowledge
For Training
Maintaining a Specific Threshold of Public Debt
For Infrastructure Development
Positive Correction: Debt & Growth
For Innovative Machinery
Indicators
Growth Sustainability
Financial Strength
Vulnerability Indicators
Conclusion
To Observe Indicators
Multifaceted Impact on the Economy
Ensuring Economic Growth
Policy Reforms Impacted Different Staggers / Values
Negative Effects Beyond threshold
Consequences of Excessive Debt
Debt Overhang
Deterred Government

3.2 Data Sources

The data for the study has been sourced from World Bank Development Indicators-WDI and State Bank of Pakistan-SBP. GDP Growth has been used as Dependent variable, while External Debt Services (Explanatory Variable-1) Exchange Rate (Explanatory Variable-2) Interest Rate (Explanatory Variable-3). These variables make the following equation for the current study.

$$dpg_t = \alpha_0 + \alpha_1 \lg eds_t + \alpha_2 xr_t + \alpha_3 ir_t + \varepsilon_t (1)$$

Where, dpg_t is notation for growth in GDP.

$\lg eds_t$ stands for the notation of log of external debt servicing.

xr stand for exchange rate.

ir_t stand for interest rate.

In the above equation α_0, α_1, α_2 and α_3 represent the coefficients of the variables of included in the studies while ε_t is the error term. The economic theory states that the sign of α_1 and α_2 are expected to be negative in relation with the economic growth and the same is also expected with α_3, which will be will have a greater effect than zero. Although the sign can be positive or negative than depending upon the strength of the effect.

For the estimation and analysis purpose, the time series data from the various sources for the period 1980-2022 have been collected. Statistical summary of all the variables used in the analysis is shown in the following table1:

Table 1: Descriptive Statistics of the Selected Variables

	GDPG	LGEDS	XR	IR
Mean	76	21.84	62.46	9.76
Median	70	21.82	57.75	9.04
Maximum	0.21	23.53	204.86	14.53
Minimum	-1.27	20.58	9.90	5.53
Std. Dev.	2.22	0.68	47.450	2.43
Skewness	-0.14	0,39	1.06	0.36
Kurtosis	3.25	3.110	3.66	2.20

GDPG = Growth of the Gross domestic product. LGEDS = log value if the external debt servicing, XR = stands for the values of exchange rate, IR = stands for the values of interest rate.

3.3 Estimation Technique

In general, the existing study report a negative effect of accumulated external debt on growth in developing countries, in spite of differences in methodological approaches. Although there are many specifications in the growth relations, most studies include a fairly standard set of debt, policy and other exogenous explanatory variables depending on the focus of the study.

The study aims to examine the relationship between economic growth and external debt services, considering interest rates and exchange rates. The Johansen maximum likelihood approach is employed for analysis. Stationarity testing of time series data is crucial to avoid spurious regression issues. Ordinary Least Square (OLS) regression may produce useless coefficients if variables are non-stationary in level form. While differencing can make variables stationary, it risks losing long-run relationships. The co-integration approach, specifically the Johansen method, is used to address this issue by maintaining variables in level form while avoiding spurious regression. This method offers two benefits: estimating long-run coefficients and identifying long-run relationships for further analysis. The analysis is done in three steps. The first step is to verify the order of integration of variables since the various integration test are valid only if the variables have the same order of integration. Standard tests for checking the presence of unit root based on Augmented Dickey Fuller (ADF) (1979 and 1981) has been used to find out the level of integration of the variables which are to be used in the current studies. The Johanson co-integration test (Johansen 1988) is used for the estimation basing the error correction techniques for the multiple equations, which will also find out the vectors for co-integration. Evidence

of co-integration rules out the possibility that the estimated relationship is spurious. Third step involves utilization of VECM. The vector error correction model will be used to find out the short run estimates.

4.1 Empirical Finding and Discussion

To handle the time series data for the co-integration technique, the data required to be tested for investigation of stationarity among the variables. So for this purpose unit root test was used through augmented Dickey and Fuller (1979).

4.2 Result Estimation

Table 2, reveals that the none stationary variables at level become stationary at first level, resultantly, making the order one integration.

Table 2: Unit Root Test Result

Variables	ADF		Integration order
	Level	1st Difference	
$GGDP_t$	-4.76	-6.82***	I(1)
$LGEDS_t$	-0.58	-8.67***	I(1)
XR_t	1.23	2.59***	I(1)
IR_t	-2.07	-6.67***	I(1)

The regression in the 1st difference having intercept. *** which indicates the rejection of null hypothesis of non-stationarity of the variable at 1 % level of significance. gdpg =gross domestic production growth, lgeds= stands for the log value of the external debt services. xr= stands for the values of exchange rate, and IR = stands for the values of interest rate.

After of confirmation of orders between the variables, the amid relationship of all the variables in the long run has been examined. To abstract the same from the time series data a co-integration rank "r" was used to seek the values of the maximum eigenvalue test and Johansen (1988), trace test and Johansen and Julius, (1990) the maximum likelihood method.

The null hypothesis $r_0 = r$ **,** was specified against the alternative hypothesis $r_0 > r$, the trace statistic has been conducted under the null hypothesis $r_0 \leq r$ in response to the alternative of $r_0 > r$ calculation of eigenvalues have been made. To apply the co-integration, test the optimal lag length is used by the selection criteria of VAR. In the study model the Schwarz Criterion was used as a basic criterion with the help of VAR model. The optimal lag length stood 1 (one) by the all the established criteria's i.e. sequential modified LR test statistic, Final prediction error, Akaike information criterion, Hannan-Quinn information criterion and Schwarz Criterion. After the selection of lag length, the Johansen text has been applied to examine the amid relationship in the long run for the variables.

Table-3 shows the long run relationship in the series by using co-integration test basing the maximum eigenvalues and trace tests statistics.

Table 3: Johansen Co-integration Test Result

Rank	Trace Statistics	Maximum Eigen Value
$r_{0} = 0$	70.03***	41.22**
$r_0 \leq 1$	28.81	17.41
$r_0 \leq 2$	11.39	6.94
$r_0 \leq 3$	4.45	4.45

*** indicate the rejection of null-hypothesis at 5% significance level.

Table 4 shows the long-run results of the Variable of external debt servicing which is in log form and hence its coefficient reflect elasticity. Variable of gross domestic production, real interest and currency exchange are already in the form of rates. The LGEDS has a negative coefficient value of -3.60 as per expectation which is statistically significant. It means that whenever there is an increase of one percent in external debt services, there will resultantly a reduction of 3.60% in the gross domestic production in the long-run. This indicate an economics logic that debt servicing has a direct impact on the annual budget such servicing prevailing in Pakistan leave fever allocation for the productive projects. The exchange rate has a coefficient of 0.051, which is positive and significant. This indicate that, whenever, there is one-unit appreciation in the domestic currency, gross domestic production will increase by 0.051%. There is a meager effect but still effect the gross domestic production.
The interest rate has a coefficient of -0.34, which is also is also negative like external debt servicing variable and having the significance. Which indicate that if there is one unit decrease in the interest rate the gross domestic production will increase by 0.34%. And that is according to the economics theory as economists have the statement that the interest rate will enhance investment and hence increase the growth rate.

Table 4: Johansen Co-Integration Estimates-Long Run

Regressors	**coefficients**	***T values***
$LGEDS_t$	-3.60	-5.29***
XR_t	0.051	4.90***
IR_t	-0.34	-4.45***

*** shows significance at 1% level. Gdpg=gross domestic production growth, lgeds= stands for the log of external debt services, xr= stand for exchange rate and IR = stands for interest rate.

Table 5, explains the result of the short run relationship of the amid variables. Being a one optimal lag length the short run result in one lag of the variables. The result appeared interesting due to the coefficient value of the ***Δlgeds (1)*** is 1.97, which is positive instead of expectation to be negative as per theory there is negative relationship in the amid variables because external debt services move in opposite direction. It is happening due to the brunch reception of external debt the investment increase which stimulate economic activity and hence resultantly GDP increases. Although in the long run as shown in Table-4 it affects negatively on the GDP.
The rest of the coefficients of the explanatory variables are statistically significant and impact as per the economic theory in the short run also. The coefficient values of the ECT is -0.85 is statistically significant and explain that it will converge and adjusted towards equilibrium level about 85% in the first period (year). Which shows a speedy adjustment in case of any shock.

Table 5: Johaansen Co integration results-ECM

Regressors	**Co-efficient**	**values**
ΔLGEDS(1)	1.97	1.55***
ΔXR1)	-0.23	-3.54
ΔIR(1)	-0.06	-0.25
Δ INTERCEPT	0.73	1.78**
ECM(-1)	-0.85	-3.19***

*** and ** shows the coefficient significance level at 1% and 5% respectively. gdpg = gross domestic production growth, lgeds = indicates log of external debt servicing, xr = stands for exchange rate, IR = stands for interest rate.

Table6, state the variance composition of grass domestic production growth variable of forty-three years. In the initial year GDPG has mostly effected by itself but as and when the debt services increase so the impact and contribution trend of GPDG decrease and trend of others variable increases in the model. At the end of the forty-three year the effect of GDPG reduces to 16.86% while the trend of other variable increase and the most prominently is exchange rate which 43.35%. The same values have also been depicted in the Figure 4 in Graphical form.

Table 6: Variance Decomposition of GDPG

Period	S.E.	GDPG	GEDS	XR	IR
1	1.550852	100.0000	0.000000	0.000000	0.000000
2	2.491977	50.29180	0.993997	42.37828	6.335920
3	2.704942	45.32644	1.136555	47.47272	6.064287
4	3.028414	46.98175	2.204209	44.10773	6.706318
5	3.268225	51.30932	2.023375	39.66077	7.006538
6	3.455128	46.88533	1.934535	42.48479	8.695344
7	3.526073	46.65589	2.843231	40.79546	9.705418
8	3.683637	48.34104	2.904102	38.30578	10.44907
9	3.788023	48.28211	2.755045	37.13284	11.83001
10	3.855764	46.95896	3.045663	36.46656	13.52882
11	3.940169	46.20873	3.569101	35.55078	14.67139
12	4.033103	46.11136	3.605408	34.31150	15.97174
13	4.095283	45.22258	3.661286	33.34670	17.76943
14	4.158665	44.00497	4.079279	32.47186	19.44389
15	4.251635	42.65863	4.386187	32.25612	20.69906
16	4.327980	41.59405	4.483604	31.60930	22.31305
17	4.396360	40.34534	4.696168	30.85927	24.09923
18	4.487390	38.74833	5.051868	30.69355	25.50625
19	4.590971	37.10801	5.251206	30.89206	26.74872
20	4.681589	35.69341	5.391335	30.65963	28.25563
21	4.781555	34.23981	5.626052	30.50663	29.62750
22	4.904156	32.56317	5.857884	30.95296	30.62598
23	5.028250	30.98932	5.988073	31.40236	31.62024
24	5.150234	29.62794	6.116791	31.58001	32.67525
25	5.288620	28.25860	6.280888	31.99213	33.46838
26	5.441501	26.83735	6.399393	32.72866	34.03460
27	5.594143	25.58373	6.469612	33.32427	34.62239
28	5.752807	24.49966	6.547396	33.81807	35.13487
29	5.926782	23.43236	6.622705	34.51890	35.42603
30	6.108549	22.41333	6.659983	35.30721	35.61948
31	6.292365	21.55513	6.678816	35.95833	35.80772
32	6.485392	20.81043	6.700158	36.59886	35.89055
33	6.689580	20.09868	6.708351	37.34740	35.84557
34	6.898397	19.46586	6.695260	38.07048	35.76839
35	7.111570	18.95269	6.676426	38.70368	35.66720
36	7.333636	18.50713	6.656002	39.34906	35.48781
37	7.563073	18.09930	6.624636	40.02282	35.25325
38	7.796258	17.76360	6.583983	40.64235	35.01007
39	8.034784	17.50325	6.542035	41.21196	34.74276
40	8.280448	17.28171	6.497595	41.78674	34.43395
41	8.531073	17.09469	6.447028	42.34939	34.10890
42	8.785357	16.96014	6.393516	42.86388	33.78247
43	9.044811	16.86792	6.340082	43.35087	33.44113

Figure-4: Variance Composition Graph with respect to GDPG

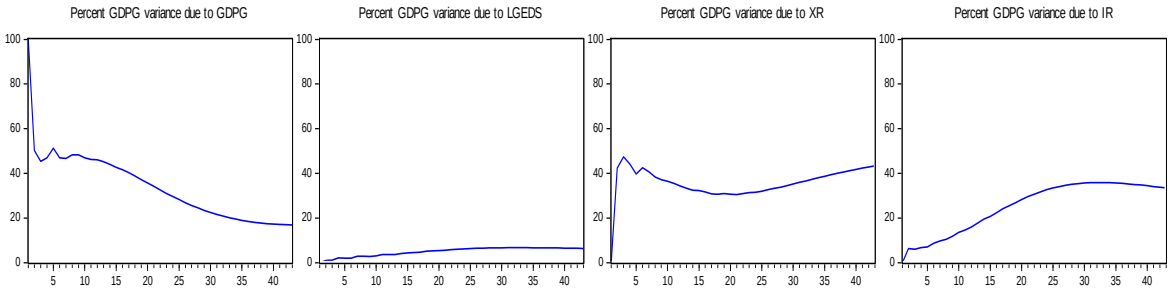


Table 7 shows the variance composition of the external debt services variable for forty-three years. It is apparent that the contribution of exchange rate and interest rate in the initial year is not explained significantly but later on it contribution improve gradually with the passage of time and in the last year exchange rate touch 39.92. The variance of external debt services effects the gross domestic production heavily but latter on its contribution decreases it may be due to the outcome of the project installed on the debt amount. Trends for the variables have also been shown in the Graphical form in Figure-5 in which the exchange rate has an increasing trend. Which depict the debt burden situation of Pakistan which become manifold due to depreciation of Pakistani rupee.

Table 7: Variance Decomposition of LGEDS

Period	S.E.	GDPG	LGEDS	XR	IR
1	0.222629	7.212391	92.78761	0.000000	0.000000
2	0.296071	16.15235	71.24725	9.705643	2.894752
3	0.338014	23.32994	64.79855	7.559348	4.312169
4	0.378869	25.66589	60.71362	8.750967	4.869523
5	0.424007	25.07343	56.01046	13.18289	5.733222
6	0.465142	26.87708	54.21360	12.52262	6.386697
7	0.508494	30.15177	50.23016	12.62162	6.996441
8	0.551795	31.24035	46.43275	15.02814	7.298755
9	0.593801	31.73782	43.83564	16.72768	7.698871
10	0.636017	33.36115	41.42607	17.10595	8.106826
11	0.680775	34.87453	38.52610	18.22915	8.370221
12	0.726189	35.42771	35.93519	20.08381	8.553280
13	0.770679	36.11789	33.86873	21.21590	8.797481
14	0.816349	37.20317	31.81077	21.97617	9.009885
15	0.864029	37.92963	29.71090	23.22121	9.138259
16	0.911870	38.32933	27.88020	24.53271	9.257765
17	0.959621	38.91341	26.26835	25.41941	9.398829
18	1.008804	39.54695	24.68099	26.26832	9.503744
19	1.059228	39.92975	23.17340	27.32494	9.571912
20	1.109706	40.24311	21.83825	28.27213	9.646507
21	1.160651	40.65278	20.60605	29.01953	9.721637
22	1.212829	41.00589	19.42095	29.80172	9.771443
23	1.265706	41.23427	18.32409	30.63272	9.808930
24	1.318766	41.46804	17.32917	31.35153	9.851252
25	1.372512	41.72785	16.39537	31.98955	9.887219
26	1.427163	41.92566	15.51243	32.65262	9.909292
27	1.482243	42.07415	14.69800	33.29928	9.928563
28	1.537654	42.23593	13.94545	33.86964	9.948985
29	1.593742	42.39118	13.23639	34.40944	9.962995
30	1.650454	42.50515	12.57131	34.95291	9.970639
31	1.707499	42.60364	11.95451	35.46376	9.978089

32	1.764950	42.70756	11.37809	35.92974	9.984607
33	1.822970	42.79660	10.83494	36.38174	9.986714
34	1.881427	42.86354	10.32616	36.82395	9.986351
35	1.940192	42.92658	9.850939	37.23645	9.986031
36	1.999364	42.98832	9.404044	37.62339	9.984241
37	2.058979	43.03711	8.982864	38.00005	9.979977
38	2.118923	43.07553	8.587435	38.36213	9.974904
39	2.179162	43.11262	8.215810	38.70192	9.969651
40	2.239762	43.14560	7.865067	39.02617	9.963163
41	2.300701	43.16993	7.534081	39.34050	9.955495
42	2.361907	43.18970	7.222202	39.64049	9.947600
43	2.423386	43.20809	6.927723	39.92479	9.939402

Figure 5: Variance Composition Graph with respect to LGEDS

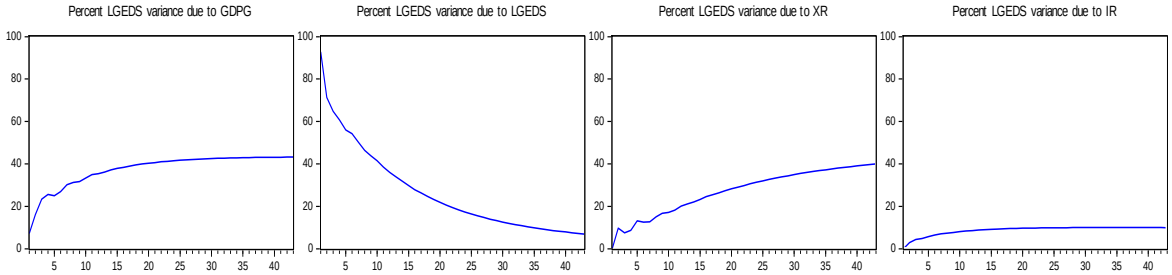


Table 8 reveals that the contribution of exchange rate and gross domestic production are significant from the very starting period which 79.70 and 18.8 respectively while in the last year i.e. 43 years it is 55.17 and 37.25. The contribution of interest rate and external debt services are nominal. The Figure 6 shows the graphical trend that the exchange rate variate due to its own values and the value of the gross domestic production. As trend for both the variable remain constant.

Table 7: Variance Decomposition of LGEDS

Period	S.E.	GDPG	LGEDS	XR	IR
1	7.366410	18.80314	1.492584	79.70428	0.000000
2	13.06362	17.47628	1.295441	81.18357	0.044715
3	16.83013	26.41972	0.906845	72.05055	0.622889
4	21.43084	34.27671	0.604008	63.95776	1.161522
5	27.45356	33.27559	0.510159	64.69163	1.522624
6	33.31785	32.62256	0.387274	65.02166	1.968511
7	39.21528	34.67382	0.340522	62.47804	2.507617
8	45.93021	35.82224	0.405858	60.91083	2.861075
9	53.10874	35.41131	0.461770	61.00069	3.126232
10	60.20088	35.54215	0.476984	60.54085	3.440016
11	67.57265	36.21287	0.518682	59.53749	3.730956
12	75.46011	36.38325	0.584975	59.09579	3.935982
13	83.53007	36.27034	0.630038	58.97589	4.123733
14	91.65233	36.44276	0.663470	58.57013	4.323633
15	100.0720	36.67583	0.709011	58.12122	4.493938
16	108.7941	36.69153	0.755451	57.92278	4.630242
17	117.6215	36.69034	0.789871	57.75528	4.764517
18	126.5754	36.80334	0.822286	57.47843	4.895951

19	135.7734	36.88464	0.858690	57.24910	5.007564
20	145.1534	36.88697	0.891559	57.11518	5.106296
21	154.6287	36.91511	0.918959	56.96202	5.203906
22	164.2497	36.97788	0.946401	56.78062	5.295098
23	174.0524	37.00806	0.974158	56.64273	5.375057
24	183.9776	37.01617	0.998769	56.53526	5.449807
25	194.0007	37.04456	1.021083	56.41194	5.522416
26	204.1585	37.07767	1.043388	56.28970	5.589238
27	214.4488	37.09188	1.064795	56.19330	5.650019
28	224.8341	37.10346	1.084154	56.10428	5.708102
29	235.3149	37.12489	1.102495	56.00900	5.763616
30	245.9089	37.14285	1.120505	55.92174	5.814913
31	256.6020	37.15238	1.137466	55.84729	5.862868
32	267.3759	37.16391	1.153207	55.77397	5.908914
33	278.2368	37.17864	1.168375	55.70041	5.952573
34	289.1889	37.18943	1.183042	55.63414	5.993384
35	300.2186	37.19732	1.196847	55.57368	6.032152
36	311.3189	37.20712	1.209916	55.51363	6.069339
37	322.4946	37.21713	1.222553	55.45574	6.104576
38	333.7427	37.22457	1.234675	55.40286	6.137901
39	345.0542	37.23138	1.246162	55.35265	6.169808
40	356.4271	37.23912	1.257166	55.30333	6.200377
41	367.8628	37.24618	1.267794	55.25658	6.229447
42	379.3565	37.25192	1.277970	55.21292	6.257187
43	390.9029	37.25770	1.287690	55.17077	6.283839

Figure-6: Variance Composition Graph with respect to XR

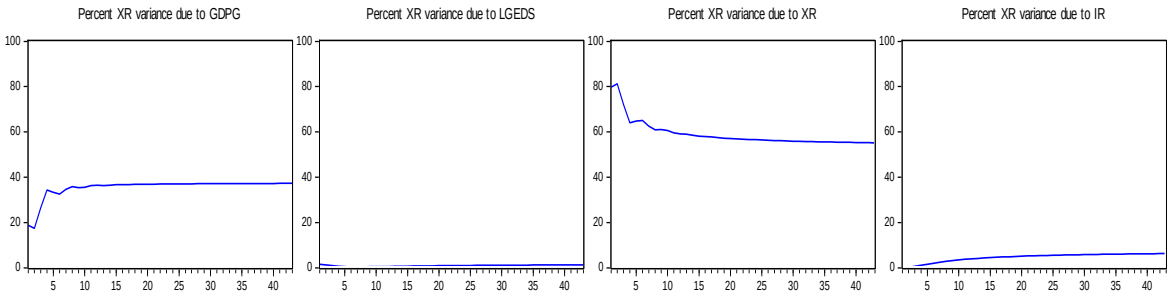


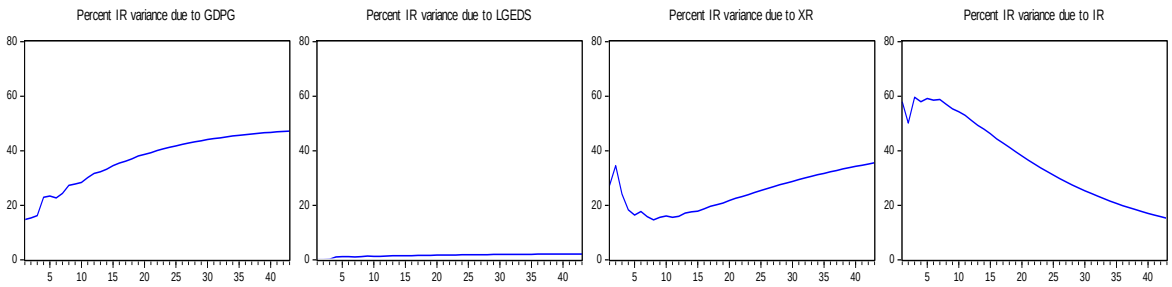
Table-8 shows result of interest rate contribution towards gross domestic production. Here too the contribution of external debt services is nominal from the first period to the last 43 periods. Variance values of interest rate, exchange rate and gross domestic production reveals significant contributions having the values of 50, 34 and 15 in the 2nd period and 15, 35 and 47 in the last 43 periods. The graph showed in the Figure-7 depicts that an increasing trend in the interest rate due to the values of exchange rate and gross domestic production. Here too the exchange rate has an upwards trend.

Table 8: Variance Decomposition of IR

Period	S.E.	GDPG	LGEDS	XR	IR
1	1.672043	14.71801	0.000316	27.31482	57.96686
2	2.500318	15.30136	0.060461	34.52927	50.10891
3	3.001763	16.09873	0.235024	24.08199	59.58425
4	3.448990	22.85669	0.974096	18.24376	57.92546
5	3.901578	23.36379	1.170501	16.35258	59.11313

6	4.276664	22.60730	1.168250	17.73489	58.48956
7	4.595112	24.37119	1.038707	15.79077	58.79933
8	4.956683	27.29047	1.182181	14.59038	56.93697
9	5.320080	27.77566	1.305480	15.56653	55.35233
10	5.625325	28.33313	1.286262	16.08562	54.29498
11	5.928730	30.14791	1.274869	15.59702	52.98020
12	6.265848	31.64092	1.377807	15.94535	51.03592
13	6.593600	32.19997	1.430190	17.05917	49.31068
14	6.892791	33.16754	1.431619	17.54932	47.85152
15	7.205696	34.55074	1.466666	17.79943	46.18317
16	7.537212	35.45551	1.534286	18.64249	44.36772
17	7.856506	36.09656	1.564173	19.59493	42.74434
18	8.167282	37.04076	1.582262	20.16348	41.21350
19	8.493155	37.99969	1.624564	20.77784	39.59790
20	8.826476	38.64642	1.667977	21.68138	38.00422
21	9.151349	39.27588	1.691253	22.49240	36.54047
22	9.477982	40.04012	1.716331	23.12707	35.11648
23	9.815973	40.70036	1.752219	23.85810	33.68932
24	10.15575	41.21063	1.781588	24.68026	32.32752
25	10.49224	41.75656	1.802511	25.39296	31.04797
26	10.83414	42.32641	1.827376	26.04456	29.80165
27	11.18310	42.79592	1.854759	26.76044	28.58889
28	11.53222	43.20813	1.876285	27.47543	27.44015
29	11.88183	43.64391	1.895161	28.11359	26.34734
30	12.23702	44.05610	1.916491	28.73724	25.29017
31	12.59622	44.40219	1.936917	29.38469	24.27620
32	12.95588	44.72976	1.953739	30.00205	23.31445
33	13.31794	45.06021	1.970072	30.57454	22.39518
34	13.68447	45.35742	1.987159	31.14367	21.51176
35	14.05339	45.61783	2.002583	31.71050	20.66909
36	14.42349	45.87086	2.016153	32.24554	19.86745
37	14.79651	46.11429	2.029704	32.75548	19.10052
38	15.17278	46.33006	2.043017	33.26036	18.36656
39	15.55078	46.52649	2.054921	33.75141	17.66718
40	15.93047	46.71660	2.065938	34.21718	17.00028
41	16.31287	46.89324	2.076848	34.66746	16.36245
42	16.69760	47.05071	2.087163	35.10899	15.75313
43	17.08385	47.19733	2.096515	35.53409	15.17207

Figure 7: Variance Decomposition of IR



5.1 Conclusion

The prime purpose of the studies was to investigate and examined the short run and long rum relationships of

the amid variables i.e. external debt servicing, exchange rate, interest rate ad gross domestic production of Pakistan for the period 1980 to 2022. By using the Augmented Dickey Fuller test all the variables are integrated on order I (1), so the Johansen Co-integration test was applied to obtain the values for long run relationship of the amid variables, which confirm the long run relationship. Furthermore, Vector Error Correction Model has applied for finding out of both short run as well as long run relationship the amid variables. The outcome of the studies is that a long run relationship pertains in the amid variables i.e. GDP, external debt servicing, exchange rate and interest rate. A negative relationship has been exhibited by the external debt servicing with the gross domestic production. A persistent payment of debt servicing creates a debt trap situation for the economy of Pakistan, which derive the state towards an awkward economic and strategically harmful situation in near future. Moreover, the coefficient value of external debt servicing is -3.60, which reveals that whenever 1% increase in the external debt appear, the GDP will have exacerbated to the tune of 3.60%.

The co-efficient of other variables are statistically significant and having the signs as expected. It is interesting that in the short run, there appear a positive relationship in the amid gross domestic production and external debt serving, as the coefficient of external debt servicing is 1.97, which indicate that whenever, increase occur in the external debt servicing GDP will follow to be increased. The prime reason for this positive relationship is that, that in the short run there is no financial liability while the loan received is invested and boost the economic activities which subsequently increases the gross domestic production while the outstanding loan become due and burden in the long run. The error correction term has a negative value of -0.85 which indicate that the steadiness level will be attained by 85% in the first period after disequilibrium. A long term visionary plan of ten to twenty years is required to be formulated by the policy maker of Pakistan in the light of dissimilarity of short and long term results.

5.2 Policy Recommendations

Pakistan needs to balance its budget having the historic fiscal deficit of Rs. 8,535 billion. Tax ratio to the GDP needed to be enhance, structural reforms are needed to be devised and implemented in FBR for widening of progressive tax base revenue. Such reform must be integrated with austerity measures through reducing the non-developmental expenses. All tax amnesty may be withdrawn provided previously through various SROs.

The ever-increasing circular debt which staggered to Rs. 2.63 trillion at the end of financial year 2022 has been created due to the subsidies provided to nearly 200 Public Sector Enterprises (PSE). It is suggested that these 200 PSE may be privatized like Vietnam privatized 9000 Sate owned Enterprise in 1986 before further swelling of the volume of circular debt. It must be conceded with the dismantling of domestic cartel which always stood a threat to the market.

Beside financial deficit the current account deficit also needed to be abridged by enhancing of export lead production, import reduction of palm oil and raw cotton (US $ 6.24 B) by replacing through indigenous production, enhancement of remittances through proper skilled worker and banks transfer payments in Pakistan. These measure will resultantly increase the foreign reserve and inflow of foreign currency.

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