Analyzing the Correlates of Fiscal Deficit in Pakistan

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Abstract

The study delineates the fiscal dimensions of Pakistan's economy to find fundamental correlates of fiscal deficit (FD). The empirical analysis was performed by the Auto-Regressive Distributed Lag (ARDL) regression technique. The results confirm that interest payments, savings-investment gap, and foreign exchange gap (FEG) are fundamental factors which cause to increase the FD while output causes to mitigate the FD. The study suggests that deficit reduction may be carried out through a reduction in the savings-investment gap, FEG, interest payments, and an increase in output by domestic resource mobilization.

Keywords: fiscal deficit, forex gap. savings-investment gap, interest payments, output

Introduction

Fiscal stability is an integral component of economic stability and growth prospectus. Since its independence, Pakistan had been facing the issue of fiscal instability. The extent of the deficit was lesser in the era of the green revolution (1960's). However, after the end of the green revolution period, Pakistan faced consecutive deficits until the 90's. Mainly it was due to foreign flow shift from grants to borrowings at tied terms and conditions and decreasing value of Pakistan's currency in terms of the dollar. In Pakistan, three different indicators; fiscal balance, revenue balance, and primary balance are reported to measure the fiscal position. Fiscal balance is the difference between total government revenue and total government expenditures. The author emphasized fiscal balance instead of the other two akin concepts.

Figure 1 shows the declining trend of FD as a percentage of GDP in the first decade of the 21st century. The major reasons behind this success were debt rescheduling reduction in debt servicing. and tremendous inflow of grants and foreign inflows. However, FD increased to 7.3 percent of GDP during 2007-08 because of policy inaction of the new government, soaring oil prices, fall in tax revenue, and an increase in unnecessary subsidies.

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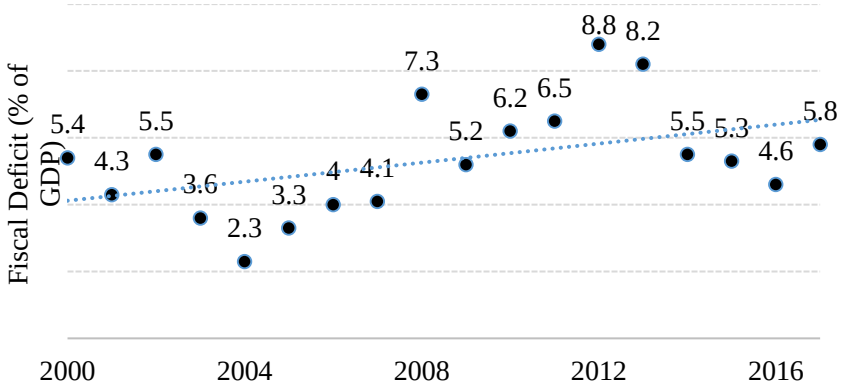

Figure 1-FD of Pakistan (MoF, 2018)

The major impasse for Pakistan in the current situation is how to alleviate the fiscal imbalances where the whole world has been facing the fiscal shocks and the destabilized fiscal policy. The major correlates of FD have not been investigated in a comprehensive way earlier. This study identifies the fundamental factors contributing to FD and suggest ways and policy lesson to overcome the problems of prolonged FD in Pakistan.

Literature Review

Hamilton and Flavin (1985) and Roubini and Sachs (1989) empirically compared the views on limitations of borrowings and their consequences towards the fiscal position. The government may run a permanent budget deficit because it pays interest payments on its borrowings and to acquire further debt to meet its budgetary needs (Hamilton & Flavin, 1985); Roubini & Sachs, 1989). There exists a strong relationship between the saving-investment (S-I) gap and budget deficit also (Summers, 1988). Any reduction in the gap between saving and investment will tailor the budget deficit and increase domestic private investment. The increase in government surplus also raises domestic investment significantly. The changes in the savings-investment gap have a strong impact on budget deficit (Feldstein & Bacchetta, 1991). Moreno (1997) pointed out that savings and investment are better reflections of government budget constraints.

Haque and Montiel (1993) analyzed the process of fiscal adjustment of Pakistan. They identified that accumulated debt and interest payments, import control to reduce public consumption, taxes and investment are a major determinant of FD. The findings of Islam (1998) identified the current account deficit as the main culprit of FD. Beetsma et

a. (2008) concluded that the current account deficit proceeds budget deficit. They also identified that government spending causes the budget deficit to rise. Major significant determinants of public sector deficit are taxes, output growth rate, capital outlays, domestic liquidity, and inflation rate (Diokono, 2007).

Farajova (2011) investigated the major reasons for the rising budget deficit and fiscal imbalances of Azerbaijan using granger causality and ARDL cointegration techniques. Long-run causality had observed running from inflation, interest rate, GDP, and exchange rate to budget deficit. The interest rate did not affect the budget deficit in the short run while current account and inflation affect the budget deficit. Murwirapachena et al. (2013) highlighted the major determinants of the budget deficit of South Africa. They termed them as economic problems instead of poor governance issues and explained the effects of macroeconomic variables on the budget deficit. They revealed that foreign reserves, unemployment, investment growth, and economic growth positive impact except for foreign debt.

Tufail et al. (2014) discussed the case of Pakistan's fiscal management. They investigated causality between the trade deficit and budget deficit. They found that budget deficit has a positive impact on trade deficit in the long run and showed bidirectional causality. They suggested that government should opt those policies that raise tax revenue and curtail unnecessary expenditures. Sound financial development may also help to reduce the budget deficit. Some other studies like Piersanti (2000), Kouassi et al. (2004), and Kim and Kim (2006) found that trade deficit significantly affects FD.

Theoretical Framework

The FD is the excess of total government expenditures over total government revenue (SBP). The relationship between government income and expenditures expressed as (Giammarioli, Nickel, Rother & Vidal, 2007);

$$G_t + rB_{t-1} = T_t + (B_t - B_{t-1}) \quad (1)$$

In equation 1; G_t, T_t, B_t, and r represent government expenditures, government total revenue, government borrowings & liabilities, and nominal interest rate respectively. According to the debt criterion, the FD is the difference between debt at the end and the beginning of the period t (Blejer & Cheasty, 1991). Therefore, change in borrowings is equal to total debt (D_t) at time t and writing equation-1 and rearranging;

$$(G_t - T_t) + rB_{t-1} = D_t \quad (2)$$

The left side of the equation is representing fundamental components of FD. Equation 2 states that debt in any period is equal to the primary budget deficit plus interest payments. So strictly speaking, debt is equal to the FD. Replacing notation and rearranging equation 2.

$$(G-T)_t = FD_t - rB_{t-1} \quad (3)$$

Equation 3 is representing the relationship between the primary deficit and FD. According to the State Bank of Pakistan (SBP), primary balance is always equal to fiscal balance excluding interest payments. Literary, the primary deficit is equal to the savings investment gap and the FEG is represented by Chenery and Strout (1966) two-gap model in equation 4.

$$(G-T)_t = (S-I)_t + (M-X)_t \quad (4)$$

Where S, I, X, and M are national savings, total investment, exports, and imports respectively. Comparing equations 3 and 4 and rearranging.

$$FD_t = (S-I)_t + (M-X)_t + rB_{t-1} \quad (5)$$

Assuming interest payments at time t are almost equal to interest payments at time t-1. Writing equation 5 again.

$$FD_t = (S-I)_t + (M-X)_t + rB_t \qquad rB_t \cong rB_{t-1} \quad (6)$$

Now, the FD is equal to the savings-investment gap and FEG (the trade balance) plus interest payments on outstanding borrowings and liabilities. To keep the study simple, concise, only output (GDP) is included in equation 6 to avoid biases and writing up in the statistical form.

$$FD_t = \beta_0 + \beta_1(S-I)_t + \beta_2(M-X)_t + \beta_3 rB_t + \beta_4 Y_t + u_t \quad (7)$$

Equation 7 shows the statistical relationship between the FD and its major correlates. The perceived relationship between the S-I gap and deficit is positive (Summers, 1988). Trade balance as a proxy variable for the FEG multiplier is expected to be positive (Ramangkura et al., 1991). The expected sign of borrowing multiplier is again expected positive because any increase in budget deficit causes the interest rate to rise and an increase in the interest rate causes the cost of borrowing to rise (Eisner, 1985). The output multiplier is negatively expected (Evans & Karras (1994.)

Research Methodology

The choice of econometric techniques depends upon the nature of data. When different variables in a model are a combination of I(0) and I(1), the ARDL method of cointegration is best for the short-run and long-run relationship as compared to Johansen method of cointegration. Akaike and Schwarz (1978) criterion applied to determine the optimum lag order. Non-stationarity checked by well-known techniques Augmented Dickey-Fuller test (1979) and Phillips-Perron test (1988). The Phillips-Perron test is a comprehensive technique to address the issue of non-stationarity because it automatically incorporates auto-correlated residuals.

The studies by Pesaran and Shin (1996), Pesaran and Pesaran (1997), Pesaran and Smith (1998), Pesaran et al. (2001) developed the ARDL data analysis technique. ARDL is useful for small sample data (Ghatak & Saddiki, 2001) as compared to the Johansen Cointegration method (1988). Johansen cointegration method requires the same order of integration while ARDL can be applied to I(0), I(1), or a combination of both. To determine the existence of long-run relationship, the ARDL model for equation 7 is expressed by equation 8.

$$\Delta FD_t = \mu_0 + \sum_{i=1}^{p1} \alpha_i \Delta FD_{t-i} + \sum_{i=0}^{p2} \beta_i \Delta (S-I)_{t-i} + \sum_{i=0}^{p3} \gamma_i \Delta (M-X)_{t-i} + \sum_{i=0}^{p4} \eta_i \Delta rB_{t-i} + \sum_{i=0}^{p5} \psi_i \Delta Y_{t-i} + \delta_1 FD_{t-1} + \delta_2 (S-I)_{t-1} + \delta_3 (M-X)_{t-1} + \delta_4 rB_{t-1} + \delta_5 Y_{t-1} + \varepsilon_t \quad (8)$$

Where $\alpha_i, \beta_i, \gamma_i, \eta_i, \psi_i$ are short-run coefficients and δ_i are long-run coefficients and p_i are the number of lags used for each variable. The author used Schwarz information criteria for the optimal lag structure. The null and alternative hypothesis of the long-run relationship of equation 8 is represented by the following expression.

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_4 = \delta_5 = 0$$

$$H_A : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_4 = \delta_5 \neq 0$$

Once the long-run relationship has been established, the long-run equation based on the level of the variables is estimated. The long-run equation is estimated by equation 9.

$$FD_t = \mu_0 + \sum_{i=1}^{p1} \alpha_i FD_{t-i} + \sum_{i=0}^{p2} \beta_i (S-I)_{t-i} + \sum_{i=0}^{p3} \gamma_i (M-X)_{t-i} + \sum_{i=0}^{p4} \eta_i rB_{t-i} + \sum_{i=0}^{p5} \psi_i Y_{t-i} + \varepsilon_t \quad (9)$$

Now $\alpha_i, \beta_i, \gamma_i, \eta_i$ and ψ_i represent long-run coefficients of FD, savings-investment gap, trade balance, interest payments, and output. Finally, the error correction term (ECT) was introduced to capture the short-run dynamics. ECM helps the researcher to estimate the speed of dynamic adjustment towards equilibrium. The error correction mechanism of ARDL (Pesaran et al., 2001) of equation 9 can be represented in equation 10.

$$\Delta FD_t = \mu_0 + \sum_{i=1}^{p1} \alpha_i \Delta FD_{t-i} + \sum_{i=0}^{p2} \beta_i \Delta (S-I)_{t-i} + \sum_{i=0}^{p3} \gamma_i \Delta (M-X)_{t-i} + \sum_{i=0}^{p4} \eta_i \Delta rB_{t-i} + \sum_{i=0}^{p5} \psi_i \Delta Y_{t-i} + \theta_1 ECT_{t-1} + \varepsilon_t \quad (10)$$

Where θ_1 is the coefficient of error correction term represents the speed of dynamic adjustment towards equilibrium per period, other slope coefficients are short-run parameters and delta represent the first difference form of the said variable. To structural breaks in all variables of economic data in the year 1971-72 (independence of Bangladesh), the study encompasses the time series data from the fiscal year 1975 to 2018. The data has been collected from State Bank of Pakistan and the Economic Survey of Pakistan published by the Pakistan Finance Division. All variables measured in million rupees except trade balance (a proxy for FEG) that have taken in million dollars at constant prices of 2005-06.

Empirical Estimation, Analysis, and Discussion

It is pre-request to check data stationarity before applying the ARDL technique. ADF (1979) and Phillips-Perron (1988) test statistics suggest that all data series are a combination of order I(0) and I(1). The outcomes of both summary statistics given in table 1. After testing stationarity, the ARDL framework of equations is estimated. Table 2 represents the estimates of the long run equation of order (2, 2, 0, 2, 3). The lower and upper bond values are 2.8 and 4.01 at a 5 percent significance level sourced from Pesaran et al. (1996). The actual estimated F-stat of the Wald test is 28.07 greater than the upper bound value confirming the long-run relationship. The study provides evidence in the support of the long-run relationship between fiscal balance and its correlates.

Table 1: Unit Root Test Summary: The Correlates of FD

Variables	Level	ADF t-statistics / Phillips-Perron	5%	P-Value	Decision
FD	Level	1.065974	-3.632896	0.9998	Non-stationary
		-2.321552	-3.529758	0.4130	
	First Difference	-5.998918	-3.533083	0.0001	Stationary
		-5.064482	-2.941145	0.0002	
MX	Level	0.275683	-3.562882	0.9976	Non-stationary
		-0.962653	-3.529758	0.9377	
	First Difference	-3.567004	-2.941145	0.0113	Stationary
		-3.060359	-2.941145	0.0383	
RB	Level	-0.586474	-3.587527	0.9717	Non-stationary
		-2.531080	-3.529758	0.3124	
	First Difference	-3.224116	-3.533083	0.0950	Stationary
		-3.060359	-2.941145	0.0000	
SI	Level	-4.565139	-3.544284	0.0045	Stationary
		-4.379296	-3.529758	0.0065	
Y	Level	-1.221156	-3.533083	0.8916	Non-stationary
		0.698706	-3.529758	0.9995	
	First Difference	-2.540976	-2.941145	0.1142	Stationary
		-3.533083	-4.033483	0.0158	

Source: Author's estimations.
Note: Upper values of each variable in each row tested with ADF t-statistics while lower values tested with the Phillips-Perron test.

All the long-run slope coefficients are statistically significant at 1 percent level of significance and have expected signs. The FEG and interest payments have a positive relationship with the FD. A one-dollar increase in imports raises the FD by 18.26 rupees. The findings are consistent with Beetsma et al. (2008). A one-rupee increase in interest payments raises the FD by 1.52 rupees. The results of Eisner (1985) and Diokono (2007) are coinciding with the behavior of interest payments in the context of the present study of Pakistan. The coefficient of output is negative and significant (Farajova, 2011); Evans & Karras, 1994). A wider savings-investment gap may cause the FD and a fall in the savings-investment gap to lower the FD. The results are like the findings of Summers (1988). Theoretically, the savings-investment gap is equal to net external resource inflow (NERI). In the case of Pakistan, S-I gap and net NERI are equal as predicted by data sourced from the State Bank of Pakistan. A raise in external flows to the domestic economy may overcome the balance between savings and investment. Any increase in NERI will reduce the savings-investment gap and hence FD. The null of no long-run relationship has been rejected in favor of a significant long-run relationship.

Table 2: Long Run Equation of FD (FD)

Regressor	Coefficients	Standard Error	t-ratio	P-Value
SI	-0.25282	0.15057	-1.6791	0.107
MX	18.2600	6.1304	2.9786	0.007
RB	1.5134	0.39386	3.8424	0.001
Y	-0.067227	0.020169	-3.3333	0.001
C	-39064.1	10789.5	-3.6206	0.001
R-Squared		DW-statistics	F-stat.	1414.5
0.99875		1.9465	(0.000)	

Source: Author's estimations.

The second part of the ARDL framework is the estimation of the short-run equation and error correction term. ECM measures the speed of dynamic adjustment towards equilibrium, significant at 1 percent level of significance, and depicts 0.73 percent adjustment per period. The

estimates are presented in table 3. Concluding the short-run and long-run analysis, the results are significant and support the hypothesis.

Table 3: Short Run Equation with Error Correction Term (ECM) of FD

Regressor	Coefficients	Standard Error	t-ratio	P-Value
dFD1	-.33337	.12596	-2.6467	.014
dSI	.061263	.072959	.83970	.409
dSI1	-.45556	.069536	-6.5515	.000
dMX	13.5002	4.4846	3.0103	.006
dRB	-1.3762	.20947	-6.5701	.000
dRB1	-3.0412	.35063	-8.6735	.000
dY	-.14868	.019931	-7.4599	.000
dY1	-.0095138	.029715	-.32017	.751
dY2	-.17092	.025481	-6.7078	.000
dC	-28881.3	8841.3	-3.2666	.003
ecm(-1)	-.73933	.14452	-5.1158	.000
R-Squared	0.98452	DW-statistics 1.9465	F-stat	146.2415 (0.000)

Source: Author's estimates.

Now the question is that whether these estimates are unbiased and correctly predicted? To verify the argument, a series of tests were conducted to check the validity of basic assumptions of regression analysis like the Lagrange Multiplier test for serial correlation, Ramsey RESET test for functional form, Skewness, and Kurtosis for normality and heteroskedasticity based on squared residuals on squared fitted values. The estimates of these test statistics are given in table 4 assures that there is no autocorrelation, no heteroscedasticity, have correct functional form and the residuals are normally distributed. Therefore, the study results are consistent and based on the basic assumptions of regression analysis.

Table 4: Diagnostic Tests: Correlates of FD

	Test Statistics	LM Version		F Version	
		Chi-Square	P-Value	F-Value	P-Value
A	Serial Correlation	0.0099563	0.921	0.0059215	0.939
B	Functional Form	4.2612	0.039	2.8634	0.105
C	Normality	0.70358	0.703	N/A	
D	Heteroscedasticity	1.2563	0.262	1.2302	0.275

Source: Author's Estimates.

A: Lagrange multiplier test of residual serial correlation.
B: Ramsey's RESET test using the square of the fitted values.
C: Based on a test of skewness and kurtosis of residuals.
D: Based on the regression of squared residuals on squared fitted values.

Conclusion

The study concludes that all variables (correlates) have significant short-run and long-run relationship with the FD. The output has a significant negative impact on FD both in the short-run and long run. However, a reduction in the FD, in the long run, is very negligible. Interest payments are triggering pressure for the further deficit. The FEG significantly increasing FD during the short run and long run. The fall in the savings-investment gap also lowers the extent of FD. Concluding, the study results are highly significant, correctly forecasted, and providing useful consideration about the matter under discussion.

Based on empirical estimation, the study suggests that the government may take initiatives to provide credit to finance the savings-investment gap. As the imports and exports are less elastic to minimize the forex gap, the government of Pakistan took measures to restrict imports of luxury consumer items. This will turn the consumer to buy domestic products and will raise the domestic output. Pakistan is heavily dependent upon domestic and external borrowing to finance its operations since its inception. High-interest rates on debt increasing the interest payment tremendously. The government of Pakistan must consider the medium and long-term cost of such financing sources otherwise the FD may hump further. To summarize the above discussion about the causal factor of FD, the savings-investment gap, FEG, interest payments, and output are integral and primary components of FD. The government may opt for investment-friendly policies, restrict luxury imports, make productive use of borrowings to expand domestic output to avoid long term FD.

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