

Determinants of Budget Deficit by Encompassing Technique



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**In The Name of Allah, the Most Merciful, the Most
Beneficent**

Dedication

This Thesis is dedicated to:

*“My Family for their Loving Wishes, Support,
Tolerance, Patience, Understanding and Guidance
and All those who Seek Knowledge to Reach the
Truth”*

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In the name of Allah who is the king of kings, the most compassionate all praise is to Allah, His holy prophet (PBUH) the mercy unto the worlds and his family. I am thankful to Allah for giving me the courage and strength to accomplish this task.

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List of Abbreviations

Abbreviations	Name
AD	Aggregate Demand
ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributed Lag Model
BB	Bangladesh Bank
BD	Budget Deficit
BDM	Budget Deficit Model
CA	Current Account deficit
CBSL	Central Bank of Sri Lanka
CFPR	CIPA Fiscal Policy Rating of the Budget Deficit
CHP	Composition of the Federal House representative by nature of the party
COR	Corruption
CSP	Alignment of the Senate by type of party
ECM	Error Correction Model Regression Model
ER	Real Exchange Rate
FD/BD	Fiscal Deficit/Budget Deficit
FDebt	Total Foreign Debt
FDI	Foreign Direct Investment
FMOLS	Fully Modified Ordinary Least Square
FOREV	Foreign Exchange Reserves
FY	Fiscal Year
GOVIN	Gross Fixed Capital Formation
GS	Government Size
GTS	General to Specific Methodology
GUM	General Unrestricted Model
HQ	Hannan-Quinn information criterion
I(0)	Integrated of Order Zero
I(1)	Integrated of Order One
ICRG	International Country Risk Guide
LAW	Law and Order
MP	Military in Politics
MS	Money Supply
OPEN	Trade Openness
PF	Index of Press Freedom
POLITY	POLITY Is Measure according to State of Government and Democracy
PR	Index of Political Rights
PS	Political Stability
RBI	Reserve Bank of India
RGDP	Real GDP Per Capita
RIR	Real Interest Rate
SBP	State Bank of Pakistan
SE	Standard Error
SIC	Schwarz information criterion
T	Time Trend

TR	Volume of Trade
VECM	Vector Error Correction Model
WDI	World Development Indicator
WGI	World Governance Indicator

Abstract

There is considerable work on the issue of the budget deficit and has gained the attention of the researchers. Each researcher gave a different model including different variables for different countries without any proper model selection. The main objective of this study is to select an appropriate model of the budget deficit for South Asian countries including Pakistan, India, Bangladesh, and Sri Lanka. For this purpose, this study has used the seven non-nested economic models of the budget deficit, and encompassing methodology has been used to select appropriate model out of these seven models.

We have used annual time series data from 2000 to 2018. Moreover, after selecting the specific models of Pakistan, India, Bangladesh, and Sri-Lanka we have employed the econometrics methodologies i.e Johansen and Juselius co-integration test, ARDL Bound testing approach, ECM regression, and VECM Granger causality approach to check the co-integrations and long-run association among the variables. VECM granger causality result shows the long run and bi-directional causality among the variables in all equations when we are taking each independent variable as a dependent variable one by one. In short-run bi-directional causality exists between budget deficit and economic growth, Money Supply (MS) and Expenditure (GEX) and Gross fixed capital formation (GCP) and money supply means both leads to each other. Furthermore, the uni-directional causality is running from budget deficit (BD) to MS, GEX, and GCP and from GEX to GDP.

The results of the ARDL bound testing approach in the case of Pakistan show that the government size, trade openness, and Corruption are a statistically significant and positive impact on the budget deficit. The co-efficient of GDP, political stability is negative and statistically significant. The results in the case of Bangladesh show that the impact of law and order, POLITY is negative the budget deficit, while here the impact of GDP is positive on the budget deficit. However, in the case of Sri-Lanka Political stability and Corruption are positively associated with the budget deficit Economic growth has negative and statistically significant impact on the budget deficit In case of Bangladesh, Pakistan, India, and Sri Lanka.

Keywords: Encompassing Approach, GTS approach, ARDL Bound Cointegration Approach, ECM Regression, VECM Granger Causality Approach

Chapter 1

Introduction

1.1 Background of the Study

The whole economic planning of any country is known as a budget or the whole fiscal side of the economy is represented by the fiscal budget. To make the progressive policies the budget is considered a very useful tool in each country. It throws light on the spendings and earnings of any country. The difference between government revenues and expenditures is known as the budget balance. The balanced budget is considered a very important foundation for sustainable economic growth. The type of revenue contains some key components (taxes, loans, and government revenues) that makeup together to format revenue for the country. Likewise, the expenditures are the compound of development and current expenditures. Moreover, the interest payments are the key part of the current expenditures.

The budget can be a deficit or surplus. The phenomenon when government spending is more than their total revenues is known as the budget deficit (BD) (Ifere & Okoi, 2018). When loans rise, at the revenue side, interest expenditures automatically increases which leads to the rise of the budget deficit. Spending increases due to several reasons i.e. borrowings by the governments to maintain the balance in the budget.

Bangladesh is a developing country and also facing the problem of BD. To achieve a targeted level of government expenditure adopted fiscal policy through proper allocation of means in a suitable dimension to reduce poverty and achieve a targeted level of growth. To attain these limits targeted revenue should be available. To fulfill these requirements Bangladesh has been adopted expansionary fiscal policy many times revenue is less than expenditure resulting

BD accrued. So it is problematic to fulfill it's through public debt which is jointly managed by Debt Management Wing (DMW) and Bangladesh Bank

Furthermore, India which is also a developing country, facing the problem of BD due to this Indian economy facing many basic issues. Still, in the 1990s the disasters of the balance of payment (BOP) hit poorly the economy of India. The quick rise in oil prices led to the Current account deficit due to this problem of BD arises Its Current account deficit fluctuated between 0.4 to 4.7 percent, as well as BD, fluctuated between 5.1 to 9.6 percent throughout the last two decades.

Likewise, Pakistan is also considered in the list of developing countries and facing the issue of consistent BD except for few years since sovereignty. The fiscal year (FY) which close in 30th June, Its BD in Fiscal FY 2004 was approximately close to 4 percent of GDP, in the next year, 3.4 percent which is less than previous FY.as well as in FY 2006 BD was 7.3 percent which was highest in the next year 4.7 percent which was significantly less than last FY and in the FY 2012 BD was 6.6 % of GDP. The problem of BD is solved through external and domestic borrowing. Due to this many economic problems arise Easterly and Schmidt-Hebbel (1993) have discussed that in case of South Asian countries since the 1980s the issue of BD has risen due to many economic problems .i.e. economic growth, high inflation, unmaintainable debt, and low investment

Furthermore, the payments required for the fiscal inequities create variations in the interest rate and also increase government loans (M. Anwar & Ahmad, 2012). The key reason for the budget deficit (BD) is a rise in public spending's with decreasing or constant collection of the revenues through taxes and the other sources. Reduction in the fiscal deficit can help in accelerating the development (Romer, 1986).

However, a decrease in the fiscal deficit harms the social development as many underdeveloped economies to reduce the fiscal deficit; they also become the cause of reduction of investments in the social sectors such as infrastructure, health, and education. Another view is that BD can be reduced by increasing the tax rate. Most of the economists agree that continual deficit creates major challenges for middle-income economies and sustain deficit can damage a country's economy (Agenor & Montiel 1999) Pakistan has been facing the issue of BD in the last two or three decades which is increasing day by day. Due to the rising trend of BD economy is facing the problem of slow growth rate and high inflation (Chaudhary & Abe, 1999).

Bayar and Smeets (2009) argue that many countries have faced the issue of constant BD from a long period; due to this issue debt levels have been rising day by day.

Moreover, Wosowei (2013) defined the budget deficit (BD) as Monterey means or overall debt amount which is essential to fulfilling the government expenditures. It is possible that government expenditures including net payments of loans are greater than returns and capital earnings through non-debt servicing. The basic incentive behind the fiscal deficit operation is that it has used for the reallocation of wealth and macroeconomic equilibrium as a tool (Antwi & Atta Mills, 2013). Furthermore, the countries which have large fiscal deficit face more difficulties as compared to the countries having lessor deficits in the case of financing expenditures.

The main problem of the South Asian countries especially Pakistan has a persistent deficit in their budgets. In these countries, there is a crucial issue of fiscal deficit as a result the public debt also raises which may lead to the in-efficient distribution of the resources. For the payment of the public debt, resource allocation will play a role as a constraint to production.

Policymakers considered that BD is responsible for low investment, low growth, high inflation, and the current account (CA) deficit (Chaudhary & Abe, 1999).

Likewise, according to Bayar and Smeets (2009), consequences and determinants of the budget deficit are the one side while the other side is significant fiscal plans, has to get more attention after the discussion on the aged population from all over the western world. According to the Monetarists, when monetization takes place the deficits tend to be inflationary it will boost the supply of money and also will increase the price level in the long-period (Gupta, 2006). Hence, the continual budget deficit (BD) can restrain the development and also the growth of the economy.

Furthermore, in under-developed countries, especially in the South Asian region, the government not only the chief employers but also the budgets constitute the most essential means distribution mechanism. The key part of the circulation of money is controlled by the governments through appropriate means i.e. taxes, subsidies, salaries, and controlling the product prices of state-owned enterprises.

Finally, as we know a complete set of the determinants of the budget deficit is missing in previous literature. Different researchers in their studies have to show the relationship among budget deficit and macro-economic variables i.e real GDP, inflation (P), lending interest rate(R) (real interest rate is the rate adjusted for inflation), government expenditures (GEX), unemployment (UN), Gross capital formation (GCF), a sum of cumulative domestic debt & foreign debt as a percentage of GDP, total debt servicing (TDS), foreign exchange reserve (FOREV) money supply (MS) and real exchange rate (ER) are used as the determinants of the budget deficit (Brima & Mansaray-Pearce, 2015; Dissanayake, 2016; Epaphra, 2017; Hassan & Kalim, 2012; Mah, 2018; Murwirapachena *et. al.*, 2013).

Moreover, some studies have discussed the political determinants i.e. alignment of the senate by type of party (CSP), the composition of the federal House of representative by nature of the party (CHP), index of political rights (PR), government size as a measure of big cabinet expenditure(GS), Polity is measure according to state of government and democracy (POLITY) GDP use as a control variable, index of press freedom (PF) and CIPA fiscal policy rating (CFPR) of the budget deficit (M. Anwar & Ahmad, 2012; Ifere & Okoi, 2018). Likewise, some studies have discussed the third prospective as the relationship of budget deficit with institutional and macro-economic variables i.e. inflation (P), Corruption (COR), Political stability (PS), Trade Openness (OPEN), Military in politics (MP), Law and Order (LAW) and RGDP is the real GDP per capita

Hence, empirical coordination is disappeared among the results of the researchers regarding the relationship of budget deficit with political, macro-economic, and institutional determinants in the case of the South Asian region by using the encompassing technique. In the previous studies, the results are conflicting due to dissimilarity in models and the estimation procedures used for analysis. Now, in our study to explain dependent variable budget deficit we have a set of models on South Asian countries when there exist many different models, based on some theoretical facts, and also based on an empirical validity, now the question is how to select among them

Hence, in the previous literature, none of the studies has used the encompassing approach for proper modeling of the budget deficit. As the modeling of determinants of the budget deficits (BD) continually attract to the academic as well as strategy makers due to the important role of BD in the economy. In this study, we have used the encompassing technique on seven non-nested models for selected South Asian countries i.e. Pakistan, India, Bangladesh and Sri-Lanka

which was used by Harvey *et. al.* (1998) in their study to explore a correct model The encompassing approach tries to select the best model among a class of models.

The objectives of the study are given below.

1.2 Objectives of the Study

Based on the above discussion, the objectives of the study can be presented as:

- To choose the appropriate models of the budget deficit for South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka from existing models by applying non nested encompassing Approach.
- To explore the short-run as well as and long-run association among BD and its determinants.

1.3 Significance of the Study

The key economic development post-World War II era is the increase and persistence of the public deficit in an extensive range of both developed and developing countries. High and explosive BD can be damaging to the welfare of society for many reasons. First, this can lead to the inefficient use of the overall resources and also perform as a restraint to the private sector by creating the “crowding out” situations. They may become the reason for a negative impact on the country's fiscal sustainability by increasing the debt to the GDP ratio; hence this has an impact on the standard of livings. Third, this can increase the level of prices generally when there is the absence of central bank independence. That's the few reasons due to third we generate the general appropriate model of the budget deficit by using the encompassing technique.

As the modeling of the determinants of the budget deficits (BD) continually attracts the attention of the academic as well as the strategy makers due to the important role of the budget

deficit in any economy. Therefore, this study constructs the general model of the budget deficit for selected South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka by using the encompassing procedure used by Harvey *et. al.* (1998). The encompassing approach attempts to extract the appropriate model among a class of models. The variables of the other models can offer a better research policy.

1.4 Scheme of the Study

The chapters of this study are organized as follows:

Chapter one consists of the introduction; which covers the budget deficit (BD) situation of South Asian countries (i.e Pakistan, India, Bangladesh, and Sri Lanka), the research gap, significance of the study, and the objectives of the study. Chapter two contains a review of the literature. Chapter three based on the methodology, details of data, and the measurement of variables and its definitions. The empirical findings are given in Chapter four while the last Chapter elaborates on the concluding remarks and the policy recommendations.

Chapter 2

Literature Review

2.1 Introduction

Literature Review is divided into two parts which are given in detail in this chapter; the first one is the theoretical literature review while the second one is the empirical literature review. In a theoretical literature review, we will discuss the theories on budget deficit presented by different schools of thought i.e. Neo-classical, Keynesian, and Ricardian points of view about the budget deficit. Moreover, in the empirical literature review, we will discuss the objectives and empirical findings of different researchers on the budget deficit with macro-economic, institutional, and political variables.

2.2 Theoretical Literature Review

This unit is related to the theoretical framework of budget deficit (BD) and macro-economic variables. There are several theoretical aspects presented by different economists on budget deficit i.e. Neo-classical school of thought, the Keynesian school of thought, and the Ricardian school of thought which are associated in their giving negative or positive support to the relationship between BD and the macro-economic variables.

The deficit expenditures by the government are the core of the debate in economics, with well-known economists which has contradictory views about this concept. According to Keynesian economists, the deficit expenditures are essential and common as part of the countercyclical fiscal strategy; however, that should not be a structural shortfall i.e. continuous and stable shortfall. Furthermore, the government should run excesses in the period of the boom while during the downturns period to overcome with the problem of the shortfall in the aggregate

demand (AD) it should run deficits subsequently over an economic cycle there is no net shortfall (i.e. merely run cyclic shortfall and not the structural shortfalls).

Since this theory is initiated in Keynesian economics and attained acceptance during the time between post-WWII and the great depression in the 1930s. During the period of the shortfall, according to the view of different economists, the ruling authority can boost the economy by deliberately running a deficit.

2.2.1 Neoclassical View about Budget Deficit

According to the Neo-classical economists, there is a negative relationship between the budget deficit (BD) and the macro-economic variables Epaphra (2017). They considered that BD leads to the greater rate of interest, does not boost the issue of the private expenditures, private bonds, and the private investment, rise persistent general price level and leads to an identical increase in the current account deficits that may ultimately slow down to the growth rate of an economy through crowding out of the resources (Bernheim, 1989; Kotlikoff, 1984; Mawejje & Odhiambo, 2020).

Furthermore, Yellen (1989) argued in his study that in the neo-classical framework, if means are at the full level of the employees in such a manner that the productivity is fixed, hereby maximum current consumption may indicate the equal and balancing decrease in the other forms of expending.

Therefore, net exports and investments must be completely crowding out. However, the case when the ruling sector expands then the private zone will contrast as a consequence the prices of these resources will increase owing to surplus demand via government, thus this phenomenon leads to a decrease in investment and consumption via the private sector. As a consequence, the development in the government sector crowds out the private sector. According

to the above theory, the effect of BD is too adverse on the economy and therefore it advocates the balanced budget at all the time (Bernheim, 1989; Bernheim, 1989; Hansen & İmrohorođlu, 2016; Rigobon, 2002; Taş, 1992).

2.2.2 Keynesian View about Budget Deficit

In contrast to the neoclassical school of thought about the budget deficit (BD), according to Keynesian, there is a positive association between BD and the macro-economic variables. They discuss that minor variations in the BD lead to the rise in the savings, aggregate demand, and the private investment at a specific level of rate of interest.

Furthermore, Bernheim (1989) argues that the rising government expenditures lead to a rise in the aggregate demand level, which leads to an increase in the use of the excessive resources that consequently lead to a rise in the output. This concept thus emphasizes that there is no essential harmful effect of BD on economic growth (Chowdhury & Saleh, 2007; Tobin, 1984).

Likewise, during the phases of economic downfall, the BD can be utilized to fuel the aggregate demand level this phenomenon will reduce the period of retrieval. However, they suggest that the budget administration should follow the anti-cyclic economic settings that imply throughout the periods of the economic downturn. However, the government must run a shortfall to inspire the aggregate demand level though in the phase of economic boom the government must follow the excess budgetary policy (Brown-Collier & Collier, 1995; Çınar *et. al.*, 2014; Hicks, 1984; Lowery, 1985; Pereira & Dall'Acqua, 1991; Taş, 1992).

2.2.3 Ricardian View about Budget Deficit

Ricardian approach to the budget deficit was firstly proposed by David Ricardo in the nineteenth century since which was later developed by Barro-Ricardian in 1989. Moreover, this

theory suggests that the BD by the ruling authority does not influence the total demand level in the economy since an increase in the government BD is in real fact equal to the rise in the future tax burden.

However, if in the present time the tax is low it will be equipoise by imposing the higher taxes in the future, it indicates that the BD does not affect the macro-economic variables. Furthermore, the government may borrow money or impose taxes to finance their spending. Yet, they will eventually pay back their borrowing by imposing high taxes than those what they would require then in the future (Becker & Paalzow, 1997; Bernheim, 1987; Choi & Holmes, 2014; Taş, 1992).

Moreover, by using the concept of rational expectations Robert Barro has developed further advanced discriminations on a similar initiative. He says that rise in the BD as a consequence of a rise in the government spending's, essential to be for whichever at the spot or in the future, with the entire current value of the receipt by the entire current value of spending (Bagheri & Keshtkaran, 2012; Barro, 1989; Marinheiro, 2008).

2.3 Empirical Literature Review

An Empirical literature review is divided into three parts i.e. the association of the budget deficit (BD) with macro-economic, political, and institutional variables are discussed in detail in the below section.

2.3.1 The literature on Budget Deficit (BD) and Macro-Economic Variables

The government should take steps for useful measures to determine the several developmental objectives in any economic system i.e. measures for fiscal deficit. The comprehensive discussion has been done by policymakers and economists on the association

between BD and macro-economic regressors i.e. rate of interest, exchange rate, growth, trade deficit, and among others in developing and developed countries (Saleh & Harvie, 2005).

Many studies in the previous literature that discuss the impact of macro-economic and political variables i.e. Uddin and Tariq (2018) use the Johannes co-integration and VECM methodology to examine the link between BD and the specific macro-economic variables from 1985-2016 for Pakistan economy. The finding shows the short-run as well as the long-run association between the budget deficit and the macro-economic regressors. Moreover, the inflation, exchange rate, gross capital formation, GDP per capita, and the exports are considered the significant determinants of the BD.

However, increasing debt and persistent budget deficits (BD) has become the main subject matter in both the developing and developed countries. This phenomenon has constrained the more empirical and theoretical literature review that explores the association between BD and macroeconomic variables (Saleh & Harvie, 2005).

Likewise, Serdar *et. al.* (2012) explored the impact of unemployment and the economic growth on the budget deficit (BD) for the era of 1998-2008 in the case of European countries. The finding shows that government expenditure has a negative impact on budget deficit (BD) which raises the BD while inflation and government revenues have a positive effect on BD which reduces the BD. Jafari *et. al.* (2007) also observed the long-term association between and the macro-economic variables and the budget deficit. The empirical results of the Johansen-Juselius co-integration test show that BD is inversely associated with inflation and economic growth in the long-run.

Furthermore, Vamvoukas (2000) confirmed that the rate of inflation and money demand have positive and significant linkages within the economy of Greece. The empirical findings of

Saleh and Harvie (2005) support the Keynesian view about BD that BD and interest rates are positively conned to each other. However, the BD may become the cause of inflation because of the rise in the MS and shortfall in the national income. Boariu and Bilan (2007) have discussed that the economy will have to face a higher inflation rate if the government tries to reduce it's BD by enhancing the supply of money.

Similarly, Makochekanwa (2008) examine related to the Zimbabwe economy shows a positive affiliation between continuous price rises and BD which is due to the rise in the monetary base. Gherghina *et. al.* (2010) have compared the members of the European Union with the Romanian economy and have found a reduction in the BD which reduces the inflation level.

Moreover, Mushtaq and Zaman (2013) have examined the connection between the BD and the macroeconomic factors i.e. economic growth (GDP), continuously price rises, the real rate of exchange and the monetary expansion indicator by using the Johnson Juselius method and ECM on the annual data for the era of 1980-2011 in case of Pakistan. The empirical findings confirmed that all the regressors except CPI have significant and positive affiliation with BD. Likewise, Brima and Mansaray-Pearce (2015) explored the association of budget deficit with the macro-economic variables in the case of Sierra Leone and has to take the annual data from 1980-2014. In their study, they used the Johansen's Juselius test, VECM and the granger causality approach to check the long-term and short-term association among the variables. The results show the long-run relationship among the variables. Furthermore, the BD has a positive affiliation with inflation and the rate of interest while inverse connections with money supply exchange rate and GDP. The short-run results also support the long-run results except for the rate of exchange. According to the Angle, Granger causality approach that there is

a causal association exists between the rate of exchange (ER), money supply (MS), GDP, inflation (P), and the budget deficit (BD).

Moreover, Dissanayake (2016) in their study examined the link between BD and the nominated macroeconomic determinants (rate of interest, inflation, debt, real GDP, and the exchange rate) by using the annual time-series data from 1980-2014 for Sri Lanka. This study has employed the ARDL bound testing methodology for the long-run and the short-run relationship while Granger causality procedure to explore the direction of the causality among variables. The findings show that there is long-term linkage among BD and the regressors. Moreover, the uni-directional causality has confirmed which is running from the BD to the debt and BD also causes inflation. There is no causality in the remaining variables of this model.

In addition to the above studies, Lwanga and Mawejje (2014) have empirically observed the association between budget deficits and nominated macroeconomic variables by applying the pairwise granger causality procedure, variance decomposition technique and using the Vector Error Correction (VECM) model by taking the period into account from 1999 to 2011 in the case of Uganda. The result has confirmed that co-integrated is present among the regressors in the long-term.

Moreover, the result of the VECM causality procedure shows that the uni-directional causality exists which is running from the budget deficit (BD) to the interest rate and the current account balance, inflation to BD while there is no causality between BD and GDP. The findings of the Pairwise Granger Causality procedure show the one-way causality association running from the BD to GDP and current account, inflation to BD while two-way causality is running between GDP and the current account balance.

Furthermore, Osuka and Chioma (2014) have analyzed the influence of the BD on the macro-economic regressors for the era of 1981-2012 in the case of the Nigerian economy. They found that long-term connotation exists between the BD and the macro-economic regressors in the model and the regressors are inflation, interest rate, and GDP by applying Johansen Co-integration technique.

Moreover, the finding also shows the two-way causality between the BD and the GDP while there is no causality association between BD and the nominal exchange rate, interest rate, and inflation. The finding also shows the long-term association between the BD and these variables .i.e. GDP, interest rate, nominal exchange rate, and the inflation rate.

The aim of the study proposed by Hassan and Kalim (2012) is to identify specific aspects that contribute to the BD. The econometric techniques i.e. Johansen Maximum Likelihood, ECM, Fully Modified Ordinary Least Square (FMOLS), and the Granger Causality approach has been applied to the data during the era 1976- 2009 in case of Pakistan. The results reveal that money supply (MS), GDP per capita, and the debt servicing lagged by one year reduces the BD while time trend, the volume of trade, and the debt services have a positive and statistically significant impact on the BD both in long-run and the short-run. Furthermore, the results also show that one-way causality is running from the BD to GDP per head and MS, from MS and volume of trade towards GDP per capita while BD and the trade both cause to each other.

The objective of this study by Ezema and Orji (2015) is to explore the feedback of BD to nominated macro-economic rudiments in Nigeria for the era of 1970 to 2012. The finding shows that in the first stage 1 S.D positive shock in GDP raises the BD but if again this phenomenon repeats it will reduce the BD.

Moreover, the association between BD and macro-economic indicators has analyzed by Epaphra (2017) for the era of 1966-2016 in the case of the Tanzanian economy. The empirical analysis has done by using the VAR, VECM, Johansen's technique, and the variance decomposition approach. The empirical findings have confirmed that long-term affiliation exists among the regressors under observation. Furthermore, according to VAR and VECM model exchange rate and real GDP are significant and negatively related to BD, likewise money supply; lending interest rate, and inflation are positively related to BD.

Furthermore, Farajova (2011) has examined the association between BD and macro-economic variables for the economy of Azerbaijan. The empirical analysis is done by using the Granger causality test, ECM, and ARDL co-integration approach. The results show that in the long run there is uni-lateral causality running from the real interest rate, inflation, GDP, exchange rate, and current account to BD. Furthermore, In the short-run uni-directional causality association which is running from the current account and the real interest rate to the BD.

Ahking and Miller (1985) examine the association between BD, inflation, and base-money growth trivariate autoregressive process. However, the results indicate that causality exists in the decades of 1950 and 1970 between money growth, government deficit, and inflation while in the 1960s the inflation and government deficits were exogenous. Likewise, Barnhart and Darrat (1988) explore the causality between BD and money growth. For empirical analysis, he applies Zellner's iterative distinct regressions and granger causality approach for the data of seven main OECD countries. The finding shows that both hypotheses i.e. (accommodation and reserve) are rejected means that both money growth and BD do not cause to each other in the long-run.

Similarly, Xie and Chen (2014) have explored the causality association between current account shortfall and the BD by applying the panel Granger causality test for eleven OECD countries. The finding confirms that two-way causality exists between the budget deficit and the current account deficit. Likewise, Mah (2018) has employed the ECM model and Johansen co-integration methodology with maximum eigenvalue. The result of the empirical analysis shows that the association between the budget deficit (BD) and economic growth is positive and significant while, BD is negatively associated with an investment.

Likewise, Murwirapachena *et. al.* (2013) describe the determining factor of BD and particularly to check whether the BD is the result of those steps taken to solve the economic issues in the case of South Africa for 1980 - 2010. For the practical assessment, this study employed the VECM technique and found that entire determinants are positively related to BD Excluding foreign debt. Though, the external reserves describe the major component variation of BD followed by the government investment, external debt, economic growth and unemployment

Moreover, the budget deficit (BD) is one of the key reasons for inflation. Therefore, the BD is a very serious problem for policymakers and also comprises important policy tools.

The fiscal strategy was adopted only on the bases of economic elements since earlier in the 1970s. At the time of commencement of institutional school of thought while, gradually more attention paid by economists on non-economic factors to regulate fiscal strategy. Institutional and political determinants get more attention since the 1970s specifically due to low growth rate and continuous rise in fiscal deficit in underdeveloped countries (Ifere & Okoi, 2018).

2.3.2 The literature on Budget Deficit and Political Variables

In previous literature, several studies have examined the association between the BD and the political variables i.e. (N. Roubini & J. D. Sachs, 1989). The result shows that the multiparty

coalition governments have a greater tendency to improve persistent and huge deficits. Moreover, on average the countries have a greater deficit where the governments have short tenures.

A few periods before the election Government provides bonuses to the voters for the sake of popularity, due to this reason in election years or just before its higher deficit seems in the political rotation Bayar and Smeets (2009). Likewise, De Haan and Mink (2005) empirically explore this situation and conclude that the BD is higher in the years of election, while this is not high before election years. Moreover, Andrikopoulos *et. al.* (2004) have discussed this phenomenon by taking the maximum period into account. The results show that during the election year's right-wing government's sports to fiscal stability.

S. Anwar and Nguyen (2014) have studied the relationship between democracy, budget deficit, and cabinet size and also the impact of a few political factors that determine the BD for Pakistan. They have employed the ARDL approach and the ECM approach to examine the long-run relationship among the variables for the era of 1976-2009. The finding confirms the long-term connection between political regressors and BD. Moreover, the consequence shows here the large government size will boost the BD while the democracy will reduce the BD.

Ifere and Okoi (2018) investigate the impact of political activates on BD for the Nigerian economy by using Herfindahl index-based composition. The finding indicates that the impact of the political considerations has a significant impact on the fiscal deficits (FD) while the impact of budgetary institutions is insignificant on fiscal policy.

2.3.3 The literature on Budget Deficit with Political and Macro-Economic

Variables

Safdar and Padda (2017) have argued that there are many reasons for high BD, from one of them is the bad performance of institutions which leads to the mishandling of public resources. In this situation, the out flow of private investment, low economic growth, and high inflation are faced due to high BD. This study has explored the effects of quality of institutions on BD for the economy of Pakistan by using the annual time series data from 1984-2014. On the bases of results, they conclude that the impact of the real per capita output is insignificant on the BD while the effects of inflation and trade openness are positive. But the real per capita output has a significant impact on the BD after taking institutional variables i.e. political stability, corruption, military in politics, and law and order under consideration. So after this, they agree that not only macroeconomic variables are the determinants of BD. Finally, they conclude that political stability has a positive impact on BD, while BD can rise due to bad institutional performance, worsened law and order condition, and higher corruption,

2.3.4 The literature on Budget Deficit with Macro Economic, Political and

Institutional Variables

Torayeh (2015) has studied the main determinants of BD in the case of the Egyptian's economy. Moreover, this study postulates that macro-economic regressors are less important than the institutional and political regressors of BD. For the empirical estimation, this study has used the ARDL approach and found that the main causes of BD are public wages, subsidy bills, and increasing interest payments. Hence a huge part of revenues is consumed on such payments. This happens due to the encouragement of unfavorable institutional and political aspects in any country.

Javid *et. al.* (2011) explore the impact of institutional, political, and economic causes of BD in the case of two regions ASEAN and South Asian countries for the period of 1948-2010. The results reveal that fluctuations in BD are associated with low institutional quality and high corruption. Moreover, the result indicates that democracy, development in economic and social conditions, and the high level of political stability decreases the shortfall in the budget volatility.

The purpose of the study by Bayar and Smeets (2009) have to find the relevant political, institutional, and macro-economic factors of EU's BD. The empirical estimation shows that the political business cycle occurs due to the robust enterprising performance of policymakers. There is a feeble impact of Partisan behavior while political fragmentation is insignificant for BD but government stability has a significant effect on BD

There is instability in fiscal deficit which happens due to economic, institutional, and political causes. The empirical investigation has been done by Agnello and Sousa (2009) for the group of 125 countries by using the data from 1980-2006. The results display that the upper stages of political instability and low level of democracy lead to higher instability in the fiscal deficit. Likewise, for small countries the volatility of BD has been expanded, for the countries having a high degree of openness and the duration of the hyperinflation.

2.4 The literature on Encompassing Methodology

The encompassing method is associated with such a capacity of a model that considers the aspects of other related models. The previous studies by .e.g. Mizon and Richard (1986), Hendry and Richard (1987b), and Lu and Mizon (1996) pay attention to parameter and variance encompassing. Mizon and Richard (1986) have explored the Cox test of variance encompassing for non-nested models after applying several tests of encompassing. Hendry and Richard (1987a) have generalized the several characteristics related to encompassing methodology and also

conclude literature on encompassing approach. The conditional mean encompassing test is constructed by Wooldridge (1990) and compare it with Mizan and Richard's Cox test of encompassing. In the case when none of the models encompass the reference model than in this phenomenon the regression-based predictive ability test related to encompassing is applicable (West & McCracken, 1998).

The encompassing approach has been applied in the following studies in previous literature .i.e. The encompassing approach has been applied by Nazir (2017) on the energy growth models. The above three models of previous studies have been examined by using the nested and non-nested encompassing approach by employing the cox and F statistics respectively. The third model has been constructed by following these two earlier researchers' Yusuf et al (2011) and Kraft (19780) models. The results show that the dependent variables better explain to Growth in the earlier two models instead of the third model. However, the third model encompasses the earlier two models. Siddique *et. al.* (2016) have focused on both internal as well as external factors for the growing industry of the Islamic banking system in the case of Pakistan. To obtained a parsimonious model they applied the encompassing approach along with general to specific technique on quarterly unstable panel data of nine banks from the duration 2004 to 2012. The findings show that the external factors are less important relatively than the internal factors, because few variables related to external factors was dropped because they were highly insignificant.

Hina and Abbas (2014) have to explore the most relevant model for consumption by using previous models .i.e. random walk model absolute and also permanent income hypotheses in case of Pakistan through encompassing methodology and general to specific (GTS) methodology by taking quarterly data from 1972-2015. They conclude that consumption is

positively affected by inflation, remittances, current interest rate, price, and GDP while negatively affected by previous interest rate.

Ur Rehman and E Alam (2014) have specified the three encompassing tests called the Ericsson test Cox test, and the Sargan test and chose the non-nested encompassing test on the bases of power and size. The result shows that the Ericsson test has more power and the Sargan test has the lowest power among these three tests.

Hina and Badar (2018) have found a proper model of balance of trade by using an encompassing approach on six present models of former researchers after this they construct a general unrestricted model era of 1979-2016 in the case of Pakistan. The results of Johansen and Juseliu's co-integration test applied to a specific model show that there exists a short-term and also long-term link between the balance of trade and its regressors.

Ur Rehman and Wajid (2017) have applied both nested and non-nested hypotheses of encompassing methodology to construct a most appropriate unemployment model. For this purpose they used the data form the duration of 1980-2015 for Pakistan. According to their results they suggest that rate of unemployment have not to impact on foreign direct investment (FDI), private investment and GDP, whereas external debt and Population growth rate has the significant impact on the unemployment rate

2.5 Literature Gap

An Appropriate and complete set of the regressors of the budget deficit is not available in the previous studies. In literature, some studies have shown that the macro-economic variables i.e real GDP, inflation (P), the lending interest rate(R) (real interest rate is the rate adjusted for inflation), government expenditures (GEX), unemployment (UN), Gross capital formation (GCF), sum of cumulative domestic debt & foreign debt as a percentage of GDP, total debt

servicing (TDS), foreign exchange reserve (FOREV) money supply (MS) and the real exchange rate (ER) are used as the determinants of the budget deficit (Brima & Mansaray-Pearce, 2015; Dissanayake, 2016; Epaphra, 2017; Hassan & Kalim, 2012; Mah, 2018; Murwirapachena *et. al.*, 2013).

Moreover, some studies have discussed the political determinants i.e. composition of the senate by type of party (CSP), composition of the federal House of the representative by type of party (CHP), index of political rights (PR), government size which is as taking under consideration as a large cabinet expenditure (GS), Polity which is taking under consideration as a democracy and the state of government (POLITY) and GDP, index of the press freedom (PF) and CIPA the fiscal policy rating (CFPR) of the budget deficit (M. Anwar & Ahmad, 2012; Ifere & Okoi, 2018). However, some studies have discussed the third perspective of the budget deficit (BD) with institutional and the macro-economic variables i.e. inflation (P), Corruption (COR), Political stability (PS), Trade Openness (OPEN), Military in politics (MP), Law and Order (LAW) and RGDP is the real GDP per capita

Hence, there is no more or less empirical evidence in the previous studies regarding the link of budget deficit with three prospectives i.e political, macro-economic, and institutional determinants in the case of the South Asian region by using encompassing technique. When there exist many models, having some theoretical background, and also many have the empirical strength then the question is that how to select the appropriate model from these models. In the previous studies, different researchers have found different results due to using different models and as well as estimation procedures used for the experimental examination. There is no more or less study which attempts an empirical analysis to choose the appropriate model of the budget deficit from three different sets of determinants as political, institutional, and macroeconomic

variables. Now in this study, we have chosen seven non-nested models to explain the output variable i.e. budget deficit in case of South Asian countries i.e Pakistan, India, Bangladesh, and the Sri-Lanka, and have found the appropriate general model of the budget deficit. In other words, to fill this gap we have analysis to find the appropriate model of the budget deficit. As a matter of fact, for a reliable policy recommendation, the appropriate modeling is an important aspect. However, no study in the previous literature exists that chooses the empirical models of the determinants of budget deficit through an appropriate process. Therefore, there is a need for a systematic study of determinants of the budget deficit, which take into account all existing models to find the appropriate model of the budget deficit.

Chapter 3

Methodology and Data Description

3.1 Introduction

In previous studies, different models on the budget deficit have been used by different researchers on the national and international levels by using different econometrics methodologies. All models are almost different from each other. While, the difficulties rises when from existing models of the budget deficit we are unable to find the true model for analysis. Regarding previous models of budget deficit if we take into account all models then the for the analysis model may become too large and gave us insignificant results. On the other hand, if we omit a few variables from the model arbitrarily then we may face the problem of omitted variable bias. To overcome the above-discussed issues we have used the encompassing approach and the general to specific (GTS) methodology to find the appropriate general model of the budget deficit.

The key objective of this analysis is to choose the appropriate general model of the BD for selected South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka. This study has employed the different economic models on budget deficit instead of taking one or two models. On these models, we have used the novel approach known as encompassing methodology. In literature, none of the studies has used the encompassing methodology to find the appropriate determinants of the BD (i.e. economically, politically, and institutionally) especially for South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka.

3.1.1 Model Selection by Encompassing Technique

In the different periods, the principles related to the encompassing approach have been discussed precisely and carefully in several contexts. Moreover, the initial look of the encompassing approach dates back in the 1980s which was done by Mizon and Hendry. The encompassing approach provides us the bases for different models comparison. Different models of the BD have been used by the different researchers in the previous studies to explore the determinants of the BD. In other words, the standard economic theory says that if we omit any relevant variable, the coefficient estimates of the remaining model would be biased. The encompassing provides us a way to avoid this bias.

Different researches have used the different variables in their analysis to choose the determinants of the BD. Now, if we ignore any one of them then it will create the issue of omitted variable bias. If we took all variables simultaneously then it may provide a very large model leading to the low perception and the inappropriate results. To overcome these issues we have employed the encompassing approach by Harvey *et. al.* (1998) for BD.

The steps of the encompassing procedure are given as:

Suppose we have n models i.e $BDM_1, BDM_2, BDM_3, BDM_4, \dots, BDM_n$, which was used by the different researchers in the previous studies. The steps of the approach are as follows.

1. Assuming that we have n models i.e $BDM_1, BDM_2, BDM_3, \dots, BDM_n$ used the previous studies.

2. Estimate these models again and gave them ranking according to their standard error.
We will set the model as a reference model that has a minimum prediction error.
(Hand, 1999; Hoover & Perez, 1999).
3. Suppose, that the BDM_i is the reference model which has the minimum standard error,

$$H_0^1 : \text{BDM}_i \text{ encompasses BDM}_1$$

$$H_a^1 : \text{BDM}_i \text{ encompasses BDM}_1$$

$$H_0^2 : \text{BDM}_i \text{ encompasses BDM}_2$$

$$H_a^2 : \text{BDM}_i \text{ does not encompasses BDM}_2$$

•
•
•

$$H_0^3 : \text{BDM}_i \text{ encompasses BDM}_n$$

$$H_a^3 : \text{BDM}_i \text{ does not encompasses BDM}_n$$

The models for which we are not able to reject the H_0 which is true then these models have their predictive power is present in the reference model then no need to add this model in the optimal model. While the models for which we reject the null hypothesis mean the alternative hypothesis is true then the predicting power of those models does not exist in the reference model then we add them in the optimal model. Finally, we come up with a new model containing the best model and model not encompassed by that best model, and then we will simplify the best model by applying the general to simple approach and attained a specific model having all significant variables.

3.1.2 General to the Specific (GTS) Approach

The main idea of GTS methodology was the first time proposed by Denis Sargen (1964) later modified by David Hendary (2001). Due to that person, this methodology attained too much popularity. General to specific approach is an important methodology to select the most appropriate analysis model. In the general model, some of the regressors may be insignificant means that variables have no impact on the output variable we dropped those variables because GTS contains on the testing down process. For the sake of the appropriate model, we have used the GTS methodology to attain the specific model. Furthermore, to test the significance of the variables we have employed an exclusion restriction test.

3.1.3 Avoiding the Spurious Regression by Co-integration Testing

Unit root tests are employed to avoid the spurious regression and also explore the stationarity of the series either the series is stationary or having unit root. Moreover, the co-integration methodology also employed to examine the long-term relationship among the BD and its determinants.

3.2 Test of Stationarity

To examine the stationarity in case of the time series data there are two important methods first on is the graphical analysis and the other method is Unit root tests. In this analysis, we have employed the Unit root methodology proposed by Dickey and Fuller to explore either the series is integrating of $I(0)$ or $I(1)$.

3.2.1 Augmented Dickey-Fuller Unit Root test (ADF)

To examine the stationarity of the series we have employed the ADF test statistics on all variables by using the constant term and trend. We have used the HQ and AIC for the selection of the lag length. ADF test considers the set of the three equations based on the deterministic

components for example without constant and trend term, with constant term and trend. This test is used to explore the order of the integration of the series.

3.3 Johansen and Juselius (1990) Co-integration Test

Two methodologies of co-integration i.e Johansen and Juselius (1990) and Engle and Granger (1987) are commonly employed to explore the co-integration in the series. The phenomena when all the variables integrating of order one then in this case we cannot use the Engle-Granger approach. Because our series is integrated of order one so we have employed the Johansen Juselius co-integration methodology to explore the short and the long-run link among the variables. Furthermore, the JJ approach starts from the Vector Autoregressive VAR process of order k which is given below:

$$Z_t = \mu + \delta_1 Z_{t-1} + \dots + \delta_k Z_{t-k} + \varepsilon_t \dots \dots \dots (3.1)$$

Where Z_t with dimension $n \times k$ is the vector of the variables which are I(1) and ε_t is the vector of residuals with $n \times 1$ dimension.

3.4 Autoregressive Distribution Lag (ARDL) Bound Testing Approach for Co-integration

To explore the long-term connection between the budget deficit and its fundamental determinants, this study has employed the econometric methodology known as ARDL bound testing methodology of co-integration, which is used to check the co-integration among the variables when the dependent variable is integrating of order one while independent variables are of mix order i.e mix of I(1) and I(0) (Pesaran *et. al.*, 2001). For a small sample size, the ARDL Bound testing approach is also an appropriate approach (Shahbaz & Lean, 2012). This methodology provides the short-run results along with the long-term results simultaneously without dropping the long-term results.

The null hypothesis is that there is no co-integration while the alternative hypothesis is that co-integration exists among the variables.

The specification of the ARDL (p,q) Model :

$$Y(L)yt = \phi + (L) + ut \dots\dots\dots(3.2)$$

$$Y(L) = 1 - Y_1L - \dots - Y_pL^p \dots\dots\dots(3.3)$$

$$\omega(L) = \theta_0 - \theta_1(L) - \dots - \theta_qL^q \dots\dots\dots (3.4)$$

Hence the ARDL (p,q) model:

$$Y(L)yt = \phi + \omega_1(L)x_1t + \omega_k(L)x_kt + ut$$

Here in this equation L is used for the Lag operator on each of the vector's components, $L^k y = yt-k$ is the representation of the lag polynomial $Y(L, p)$ and to the vector polynomial (L, q) . The residual term is stationary as well as not correlated with both output and regressors. The ARDL (p, q1, q2.....qk) model is given in the following equation:

$$\Delta X_t = \gamma_{0i} + \sum_{i=1}^k \beta_i \Delta X_{t-1} + \sum_{i=1}^k \beta_2 \Delta Y_{t-i} + \gamma_1 X_{t-1} + \gamma_2 Y_{t-1} + v_{it} \dots\dots\dots(3.2)$$

In the above equation K represent the maximum lag order selected through AIC and HQ lag selection criteria. $(\beta_1 - \beta_2)$ represents the dynamics in the model in the short-run while F-statistic shows to the Ho that the lagged variables coefficient $(\gamma_1 X_{t-1} \gamma_2 Y_{t-1})$ is zero This is examined in each number.

H₀: $\gamma_1 = \gamma_2 = 0$ long-term connection does not present

H₁: $\gamma_1 \neq \gamma_2 \neq 0$ long-run connection does present

The null is rejected means the long-term association is present among the variables. When the F-statistic is greater than the upper critical bound while we cannot reject the null when f-bound is less than the upper bond means there is no long-term association. Moreover, the

phenomena when the F-stat value lies between the upper and the lower bound then we can conclude that results are inconclusive.

3.5 Error correction (ECM) Regression Model

To explore the long-term relationship the Engel Granger procedure has used. ECM is a representation of the short-term model which restores the variable to the long-term association from the disequilibrium state. ECM in the equation form as follows:

$$\Delta Y_t = \alpha + \beta_0 \Delta X_{t-i} - \beta_1 EC_{t-i} + \varepsilon_{it} \quad (3.3)$$

Single equation of the ECM is given below:

$$\Delta Y_t = \alpha + \beta_0 \Delta X_t - \beta_1 (Y_{t-1} - \beta_2 X_{t-i}) + \varepsilon_{it} \quad (3.4)$$

The parenthesis portion of the equation consists of the error correction mechanism. β_0 is the element which shows the impact of regressors on the output variable in the short run, while the β_1 is the speed of the adjustment towards the equilibrium after the deviation. If the co-efficient of the ECT term is negative and statistically significant then it means that fluctuations in the regressors and the output variable lead to the long-term equilibrium. ECM can be derived from the ARDL, therefore ECM is a special case of ARDL and one can derive ECM from ARDL by testing certain restriction.

3.6 VECM Granger Causality Test

To examine the causal association among the VECM is an important methodology which is subject to the existence of a co-integration association. The main concept of this methodology is that whether the previous values of the regressors predict the dependent variables. If the past vales of regressors do predict to they then it means X cause to the Y. In this scenario, we have employed the VECM approach to finding the causality association among BD and its determinants.

The equation of the VECM approach is given below

$$(1-L) \begin{bmatrix} LnBD_t \\ LnGDP_t \\ LnMS_t \\ LnGEX_t \\ LnGCP_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \end{bmatrix} + \sum_{i=1}^p (1-L) \begin{bmatrix} \beta_{11p} & \beta_{12p} & \beta_{13p} & \beta_{14p} & \beta_{15p} \\ \beta_{21p} & \beta_{22p} & \beta_{23p} & \beta_{24p} & \beta_{25p} \\ \beta_{31p} & \beta_{32p} & \beta_{33p} & \beta_{34p} & \beta_{35p} \\ \beta_{41p} & \beta_{42p} & \beta_{43p} & \beta_{44p} & \beta_{45p} \\ \beta_{51p} & \beta_{52p} & \beta_{53p} & \beta_{54p} & \beta_{55p} \end{bmatrix} \times \begin{bmatrix} LnBD_{t-1} \\ LnGDP_{t-1} \\ LnMS_{t-1} \\ LnGEX_{t-1} \\ LnGCP_{t-1} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \\ \lambda_4 \\ \lambda_5 \end{bmatrix} (ECT_{t-1}) + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix}$$

According to the above equation (1-L) represent the difference operator while ECT_{t-1} represents the lagged ECT term which has been taken from the long term relationship. Where, ε_{1t} , ε_{2t} , ε_{3t} , ε_{4t} , and ε_{5t} are the residuals. It is assumed that the stochastic terms are supposed to be homoscedastic. ECT_{t-1} is the coefficient of the lagged error term and its statistical significance shows the long-term causal association among the set of the variables.

3.7 Data and source

The data sources are World development indicator (WDI) Polity IV for political data, WGI, Freedom house, PRS: ICRG dataset

Table 3.1 Detailed Information of Variables

Variables	Symbols	Definition/measurement	Source of data
Budget deficit	BD	Government revenues – government expenditures	WDI
Gross Domestic Product	GDP	Gross domestic product	WDI
Inflation	P	Consumer price index	WDI (2010 = 100)
Lending interest rate	LIR	Lending interest rate (%)	WDI
Money supply	MS	Money Supply (Broad Money Supply [M2])	(SBP),(RBI),(CBSL) & (Bangladesh bank)
Exchange rate	ER	The Real effective ER indices (CPI-based), annual	IFS
Government	GEX	Expense (% of GDP)	WDI

expenditure			
Unemployment	UNEMP	Percentage of the total labor force	WDI
Gross capital formation	GCP	Gross fixed capital formation (% of GDP)	WDI
Total Debt servicing	TDS	Total debt servicing (percent of GDP)	WDI
Volume of trade	TR	Imports of goods and services+ Exports of goods and services	WDI
Time trend	T	Time is consider as 2000=1, 2001=2,... ,2018=19.	-----
Total foreign debt	FDebt	Debt service on external debt, public and publicly guaranteed	WDI
Reveres	FOREV	Foreign exchange reserves	(SBP),(RBI),(CBSL) & (Bangladesh bank)
Real interest rate	RIR	Real interest rate (%)	WDI
Current account deficit	CA	Exports of goods and services - Imports of goods and services	WDI
Government size	GS	General government final consumption expenditure (constant 2010 US\$)	WDI
Polity	POLITY	Government effectiveness estimate	WGI
Trade openness	OPENS	Trade (% of GDP)	WDI
Law and order	LAW	Law and order situation is define as the condition when people follow the rule and regulation. There is no violence or threats and the police control all the crime etc.	ICRG

Corruption	COR	.....	ICRG
Political instability	PS	.....	ICRG
Military in politics	MP	.....	ICRG

Chapter 4

Empirical Results

4.1 Introduction

To make the progressive policies the budget deficit is considered a very useful tool in each country. It throws light on the spendings and earnings of any country. The difference between government revenues and expenditures is known as the budget balance. The balanced budget is considered a very important foundation for sustainable economic growth (GDP).

In the analysis we have followed the seven existing models of the budget deficit in previous studies constructed by different researchers at the national level i.e. BDM₁, BDM₂, BDM₃, BDM₄, BDM₅, BDM₆ and BDM₇ South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka. To formulate a general model we have applied the encompassing technique on the seven existing models of budget deficit (BD). After specifying the general model we employed the general to specific (GTS) methodology on this model and attained a specific model.

4.2 Specifying Model for the Determination of Budget Deficit

In the previous studies, different models on budget deficit have been used for different countries, which are based on different theoretical backgrounds. In this analysis, we have employed the seven different models for the determination of the budget deficit using encompassing approach for the selected South Asian countries i.e Pakistan, India, Bangladesh, and the Sri Lanka countries. The models which are selected for encompassing are given below:

4.2.1 Budget Deficit Model 1 (BDM₁)

Epaphra (2017) and Brima and Mansaray-Pearce (2015) used the following model for the macro-economic determinants of the budget deficit.

$$BD_t = \beta_{10} + \beta_{11}GDP_t + \beta_{12} P_t + \beta_{13}LIR + \beta_{14} MS_t + \beta_{15}ER_t + U_{1t} \dots \dots \dots (4.1)$$

Where

- BD Budget deficit
- GDP Gross Domestic Product (Real GDP per capita)
- P Inflation
- R Lending Interest Rate (Real interest rate adjusted for inflation)
- MS Money Supply
- ER Real Exchange Rate

4.2.2 Budget Deficit Model 2 (BDM₂)

Mah (2018) have employed the following model for the determinants of the budget deficit (BD) in the case of South Africa

$$BD_t = \beta_{20} + \beta_{21}GDP_t + \beta_{22} GEX_t + \beta_{23}UNEMP_t + \beta_{24} GCP_t + U_{2t} \dots \dots \dots (4.2)$$

Where

- GDP Gross Domestic Product (Real GDP per capita)
- GEX Government Expenditures
- UNEMP Unemployment
- GCF Gross Capital Formation

4.2.3 Budget Deficit Model 3 (BDM₃)

Shahid Hassan and Kalim (2012) explore the macro-economic determinants of the BD for Pakistan

$$BD_t = \beta_{30} + \beta_{31}GDP_t + \beta_{32} TDS_t + \beta_{33}TR_t + \beta_{34} MS_{34} + \beta_{35}T_{35} + U_{3t} \dots \dots \dots (4.3)$$

Where

- BD Budget deficit

GDP	Gross Domestic Product (The Real GDP per capita)
TDS	Total Debt Servicing (percent of GDP)
TR	The volume of the Trade (share of GDP)
MS	Money Supply (Monetary asset as the share of the GDP)
T	Time Trend

4.2.4 Budget Deficit Model 4 (BDM₄)

Murwirapachena *et. al.* (2013) implemented the model with modifications which are used by N. Roubini and J. Sachs (1989) and Bayar and Smeets (2009) to examine the link between BD and the macro-economic determinants for South Africa.

The model is given below

$$BD_t = \beta_{40} + \beta_1 GDP_{41} + \beta_2 UNEMP_{42} + \beta_3 FDebt_{43} + \beta_4 FOREV_{44} + \beta_5 GOVIN_{45} + U_{4t} \quad (4.4)$$

Where

BD	The budget deficit (% of GDP)
GDP	Gross Domestic Product (GDP in R million)
UNEMP	Unemployment rate
FDebt	Total Foreign Debt
FOREV	Foreign Exchange Reserves
GOVIN	Gross Fixed Capital Formation (a proxy for Government)

4.2.5 Budget Deficit Model 5 (BDM₅)

Farajova (2011) employed the following macro-economic variables to determining the budget deficit in case of Azerbaijan

$$BD_t = \beta_{50} + \beta_{51} GDP_t + \beta_{52} P_t + \beta_{53} RIR_t + \beta_{54} CA_t + \beta_{55} ER_t + U_{5t} \dots \dots \dots (4.5)$$

Where

BD	The budget deficit (% of GDP)
GDP	Gross Domestic Product (GDP in R million)
P	Price
RIR	Interest Rate (deduct inflation rate and used the Real Interest Rate)
CA	Current Account Deficit
ER	Exchange Rate

4.2.6 Budget Deficit Model 6 (BDM₆)

S. Anwar and Nguyen (2014) has explored the political determinants of the BD for Pakistan using the data from 1976-2009

$$BD_t = \beta_{60} + \beta_1 GS_{61} + \beta_2 POLITY_{62} + \beta_3 GDP_{63} + U_{6t} \dots \dots \dots (4.6)$$

Where

BD	Budget Deficit
GS	Government Size (a measure of large cabinet expenditure)
POLITY	POLITY (is used for democracy and the state of government)
GDP	Gross Domestic Product

4.2.7 Budget Deficit Model 7 (BDM₇)

Safdar and Padda (2017) have to investigate the institutional and economic determinants of the fiscal deficit using annual data from 1984-2014 in case of Pakistan

$$BD_t = \beta_{70} + \beta_1 RGDP_{71} + \beta_2 P_{72} + \beta_3 OPENS_{73} + \beta_4 COR_{74} + \beta_5 LAW_{75} + \beta_6 PS_{76} + \beta_7 MP_{78} + U_{7t} \dots \dots \dots (4.7)$$

Where

BD	The budget deficit (% of GDP)
RGDP	The Real GDP per capita

P	Inflation
OPENS	The Trade Openness
COR	Corruption
LAW	Law and the Order
PS	The Political Stability
MP	Military in the Politics

4.3 Selection of General Model through Encompassing Approach

In the previous chapter, we have discussed briefly the procedure of encompassing methodology. In this section, we have used empirically the seven existing models of different researchers of the budget deficit. First, we have constructed the standard error of each model and then we assign ranks to these errors. We assign the first rank to the smallest prediction error after this we set this model as a reference model. Then based on the reference model we have employed the encompassing methodology on these six models to construct the general model of budget deficit (BD) for each South Asian country i.e. Pakistan, India, Bangladesh, and Sri Lanka.

$$BD_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \dots + \beta_n X_{nt} + \epsilon_t \dots \dots \dots (4.8)$$

Where BD is the budget deficit which is the dependent variable while $X_{1t}, X_{2t}, \dots, X_{nt}$ are the regressors of the general model. To construct a specific model from the general model we have employed the general to specific (GTS) methodology by imposing the Wald co-efficient restrictions on the general model. The general procedure of the encompassed worked as follows:

Table 4.1: Model Selection through Encompassing Approach for Pakistan, India, Bangladesh, and Sri Lanka

	Pakistan		India		Bangladesh		Sri Lanka	
	St.Error	Rank	St.Error	Rank	St.Error	Rank	St.Error	Rank
BDM₁	0.616	3	0.412	1	0.456	3	0.431	2
BDM₂	0.654	5	0.424	2	0.464	4	0.577	3
BDM₃	0.689	7	0.483	3	0.478	7	0.482	4
BDM₄	0.656	6	0.562	5	0.475	6	0.491	5
BDM₅	0.604	2	0.572	6	0.442	2	0.531	6
BDM₆	0.637	4	0.589	7	0.436	1	0.603	7
BDM₇	0.416	1	0.509	4	0.467	5	0.316	1

In the first step, we have estimated the seven models of budget deficit i.e. BDM₁, BDM₂, BDM₃,..... BDM₇, separately for each South Asian country i.e Pakistan, India, Bangladesh, and Sri Lanka. We have ranked the above models according to their standard error to find a reference model that has a minimum error. In case of Pakistan, the model seven (BDM₇) has the minimum error having value (0.416), Model 1 (BDM₁) has the minimum prediction error in case of India having value (0.412), Model₆ has the minimum standard error in case of Bangladesh with value (0.436) and model seven has the minimum prediction error in case of Sri Lanka having value (0.316) amongst the existing seven models which have given above in Table 4.1.

Table 4.2 Test of Encompassing for Pakistan

Encompassing in case of Pakistan	Test Statistics				
	Hypothesis	Cox-Test		Ericsson Test	
BDM ₇ encompasses BDM ₁	-4.008**	(0.0016)	1.474*	(0.0446)	
BDM ₇ encompasses BDM ₂	0.6292	(0.5292)	-0.4935	(0.6216)	
BDM ₇ encompasses BDM ₃	0.8122	(0.4167)	-0.6504	(0.5154)	
BDM ₇ encompasses BDM ₄	0.2309	(0.8174)	-0.1777	(0.8589)	
BDM ₇ encompasses BDM ₅	0.2963	(0.7670)	-0.2284	(0.8193)	
BDM ₇ encompasses BDM ₆	-6.383**	(0.0032)	2.613*	(0.0468)	
Note: * and ** indicates significance at 5% and 1% level					

All seven models are non-nested which we took in this analysis. In the case of Pakistan, we chose the model 7 (BDM₇) as a reference model. For encompassing we have used Ericsson (1983) and Cox (1961) approaches to test the null hypothesis (H_0) that BDM_i encompasses BDM₁, BDM₂, BDM₃,....., BDM₇ while the alternative hypothesis is that BDM_i does not encompass BDM₁, BDM₂, BDM₃,....., BDM₇. The results of the encompassing approach in the case of Pakistan show that BDM₂, BDM₃, BDM₄, BDM₅ do not reject the null hypothesis while BDM₁ and BDM₆ reject to the H_0 that BDM₇ do not encompass to BDM₁ and BDM₆.

Therefore the general unrestricted model in the case of Pakistan is formulated by incorporating the variables of BDM₁, BDM₆, and BDM₇ simultaneously. There is no need for separate estimation of BDM₂, BDM₃, BDM₄, and BDM₅ because their predicting power is already present in BDM₇. Therefore, we include the variables of BDM₁ and BDM₆ in BDM₇ because the predicting power of model one and model six models is not present in model seven.

Table 4.3 Results of Encompassing Approach for India

Encompassing for India Hypothesis	Test Statistics			
	Cox-Test		Ericsson Test	
BDM ₁ encompasses BDM ₂	-5.926**	(0.0034)	1.984*	(0.0472)
BDM ₁ encompasses BDM ₃	-1.251	(0.2109)	0.9655	(0.3343)
BDM ₁ encompasses BDM ₄	0.6196	(0.5355)	-0.5931	(0.5931)
BDM ₁ encompasses BDM ₅	-5.668**	(0.0000)	4.554**	(0.0000)
BDM ₁ encompasses BDM ₆	0.7287	(0.4662)	-0.6356	(0.5250)
BDM ₁ encompasses BDM ₇	-1.585	(0.1131)	1.185	(0.2359)
Note: * and ** indicates significance at the 5% and 1% level				

In the above table, all seven models are non-nested which we took for analysis. In the case of India, we have used model 1 (BDM₁) as a reference model. For encompassing we have used Ericsson (1983) and Cox (1961) approaches to test the null hypothesis (H₀) that BDM_i encompass BDM₁, BDM₂, BDM₃,....., BDM₇ while the alternative hypothesis is that BDM_i does not encompass BDM₁, BDM₂, BDM₃,....., BDM₇. The results of encompassing approach in case of India shows that BDM₃, BDM₄ BDM₆, BDM₇ do not reject the null hypothesis while BDM₂ and BDM₅ reject to the null hypothesis (H₀) at the 1% significance in case of Cox test while at 5% in Ericsson test that BDM₁ do not encompass to BDM₂ and BDM₅.

Therefore the general unrestricted model in the case of India is formulated by incorporating the variables of BDM₂, BDM₅, and BDM₁ simultaneously. There is no need for separate estimation of BDM₃, BDM₄, BDM₆, and BDM₇ because their predicting power is already present in BDM₁. Therefore, we include the variables of BDM₂ and BDM₅ in BDM₁ because the predicting power of model two and model five is not present in model one.

4.3.2 General Unrestricted Model (GUM) of Budget Deficit (BD) for India

In the case of India, the GUM is constructed by incorporating the variables of model two and model five in model one simultaneously. The GUM is given below.

$$\ln BDM^{GI} = \gamma_0 + \gamma_1 \ln GDP + \gamma_2 \ln P + \gamma_3 \ln LIR + \gamma_4 \ln MS + \gamma_5 ER + \gamma_6 \ln RIR + \gamma_7 \ln CA + \gamma_8 \ln GEX + \gamma_9 UNEMP + \gamma_{10} \ln GCP + U_t \dots \dots \dots (4.9)$$

Where, Where lnBD is the log of budget deficit which is measured as government revenue minus government expenditures, UNEMP for unemployment, lnGCP is the log of used for gross capital formation, lnP stand for the log of inflation measured as a consumer price index, lnGDP is the log of GDP per capita, lnMS indicates to the log of money supply, ER is for rate measured as (Exchange Rates, US Dollar per Domestic Currency, End of Period), lnLIR is the log of lending interest rate, lnRIR is for the log of interest rate measured as (deduct inflation rate and used Real Interest Rate), lnCA is for the log of current account deficit and lnGEX represent to the log of government expenditures.

Table 4.4 Test of Encompassing for Bangladesh

Encompassing in case of Bangladesh Hypothesis	Test Statistics			
	Cox-Test		Ericsson Test	
BDM ₆ encompasses BDM ₁	-5.323**	(0.0012)	1.937*	(0.0201)
BDM ₆ encompasses BDM ₂	-0.3312	(0.7405)	0.2878	(0.7735)
BDM ₆ encompasses BDM ₃	-0.2671	(0.7894)	0.2326	(0.8160)
BDM ₆ encompasses BDM ₄	-1.521	(0.1283)	1.293	(0.1961)
BDM ₆ encompasses BDM ₅	-1.460	(0.1443)	1.234	(0.2171)
BDM ₆ encompasses BDM ₇	-7.372**	(0.0000)	5.735**	(0.0000)

Note: * and ** indicates significance at 5% and 1% level

of the trade openness measured as trade (% of GDP), MP stands for the military in politics, lnLAW is the log of law and order, lnGDP is the log of the GDP per capita, lnMS is for the log of money supply, ER is for exchange rate measured as (Exchange Rates, US Dollar per Domestic Currency, End of Period), lnLIR is the log of lending interest rate, lnGS is the log for Government Size measured as (large cabinet expenditure) and POLITY which is used for democracy and the state of the government.

Table 4.5 Test of Encompassing for Sri Lanka

Encompassing in case of Sri Lanka Hypothesis	Test Statistics			
	Cox-Test		Ericsson Test	
BDM ₇ encompasses BDM ₁	-2.195**	(0.0032)	1.549*	(0.0214)
BDM ₇ encompasses BDM ₂	0.4548	(0.6493)	-0.3493	(0.7269)
BDM ₇ encompasses BDM ₃	0.9610	(0.3366)	-0.7647	(0.4445)
BDM ₇ encompasses BDM ₄	-1.445	(0.1484)	1.023	(0.3064)
BDM ₇ encompasses BDM ₅	-8.062**	(0.0000)	5.687**	(0.0000)
BDM ₇ encompasses BDM ₆	0.7091	(0.4783)	-0.5413	(0.5883)

Note: * and ** indicates significance at 5% and 1% level

The models which we took for analysis are non-nested. In the case of Sri-Lanka our reference model is 7 (BDM₇). For encompassing we have used Ericsson (1983) and Cox (1961) approaches to test the null hypothesis (H₀) that BDM_i encompasses BDM₁, BDM₂, BDM₃,....., BDM₇ while the alternative hypothesis is that BDM_i does not encompass BDM₁, BDM₂, BDM₃,....., BDM₇. The results of encompassing approach in case of Sri Lanka shows that BDM₂, BDM₃ BDM₄ and BDM₆ do not reject the null hypothesis while BDM₁ and BDM₅ reject to the null hypothesis at 1% significance level in case of Cox test while at 5% level in Ericsson

4.4 General to Specific Modeling

After constructing the unrestricted general models for the selected countries i.e Pakistan, India, Bangladesh, and Sri Lanka $\ln BDM^{GP}$, $\ln BDM^{GI}$, $\ln BDM^{GB}$ and $\ln BDM^{GS}$ we simplified the general model by applying the GTS methodology to construct a specific and appropriate model.

4.4.1 General to Specific Modeling for Pakistan

For Pakistan, the results of the encompassing approach explore that BDM₇ has the minimum standard error therefore we consider the BDM₇ as a reference model. The reference model encompasses BDM₂, BDM₃, BDM₄, and BDM₅ while do not encompass the BDM₁ and BDM₆. Consequently, we make a general model in case of Pakistan by including the variables of BDM₁ and BDM₆ in BDM₇ because their predicting power is not present in the reference model. After constructing the general model through encompassing we construct the specific model. In the general model, some regressors may have an insignificant impact on the dependent variable. Hence, in this case, we omit all variables that have an insignificant impact on the output variable.

$$\ln BDM^{GP} = f(\ln GDP, \ln P, \ln OPENS, COR, \ln LAW, \ln PS, MP, \ln LIR, \ln MS, ER, \ln GS, POLITY) \dots\dots\dots (4.12)$$

Table 4.6 Results of General to Specific Approach for Pakistan

Variables	Step:1	Step:2	Step:3	Step:4	Step:5	Step:6	Step:7
L.BD: Log of budget deficit is used as a dependent variable							
Constant	0.935 (0.386)	1.03 (0.338)	1.70 (0.127)	1.79 (0.106)	1.65 (0.090)	1.925 (0.053)	2.374 ** (0.041)
lnGDP	-0.610 (0.564)	-0.930 (0.383)	-1.05 (0.325)	-1.09 (0.305)	-1.460 (0.105)	-2.71 (0.020)	-2.88** (0.013)
lnP	0.101 (0.923)	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....
lnLIR	-2.69 (0.036)	-3.42 (0.011)	-3.64 (0.006)	-5.51 (0.000)	-5.43 (0.000)	-4.66 (0.000)	-4.70 *** (0.000)
lnMS	-1.06 (0.349)	-1.74 (0.336)	-1.85 (0.301)	-2.13 (0.262)	-1.87 (0.291)	..... .....	..... .....
ER	-0.551 (0.602)	-0.931 (0.382)	-0.981 (0.355)	-1.02 (0.335)	..... .....	..... .....	..... .....
lnGS	2.04 (0.087)	2.23 (0.061)	2.82 (0.022)	3.22 (0.010)	3.15 (0.010)	2.33 (0.039)	2.61 ** (0.023)
POLITY	-0.199 (0.849)	-0.244 (0.813)	-0.232 (0.822)	..... .....	..... .....	..... .....	..... .....
lnOPEN	1.75 (0.130)	1.91 (0.098)	2.62 (0.030)	2.81 (0.020)	2.88 (0.016)	2.84 (0.016)	2.90 ** (0.013)
COR	3.18 (0.019)	3.44 (0.010)	4.73 (0.001)	6.13 (0.000)	6.81 (0.000)	5.95 (0.000)	6.12 (0.000)
lnLAW	1.46 (0.193)	1.79 (0.117)	2.01 (0.079)	2.16 (0.058)	1.98 (0.075)	0.899 (0.388)	..... .....
lnPS	-2.31 (0.061)	-2.80 (0.026)	-3.19 (0.012)	-3.74 (0.004)	-3.68 (0.004)	-2.98 (0.012)	-2.91** (0.013)
MP	0.112 (0.914)	0.180 (0.862)	..... .....	..... .....	..... .....	..... .....	..... .....
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at 10% (p<0.1) and P.values are given in the parentheses.							

In table 4.6 we estimate the general model by using GTS methodology to find the appropriate model based on the p and the t-value. On the insignificant variables, we have imposed the restriction with the null hypothesis that the variable has an insignificant impact on the output variable. In the first step, we exclude the P variable based on t and p-value because the p-value is highly insignificant. In the second step, we have excluded the MP variable because its p-value is very insignificant means this variable has no impact on the output variable. In the third step, the

POLITY variable is highly insignificant and we exclude this variable by imposing the restriction which shows that POLITY has no impact on the budget deficit. Similarly, from fourth to the seventh step we have dropped the other variables that are highly insignificant one by one until we reach with the appropriate model with significant p-values.

Table 4.7 Insignificant Variables in General Model in case of Pakistan

Steps	Variables	Exclusion restriction test	Remarks
Step 1	lnP	0.010183 (0.923)	Excluded
Step 2	MP	0.0324 (0.862)	Excluded
Step 3	POLITY	0.0540 (0.822)	Excluded
Step 4	ER	1.0360 (0.335)	Excluded
Step 5	lnMS	3.4940 (0.910)	Excluded
Step 6	lnLAW	0.8079 (0.3880)	Excluded

After applying the encompassing approach and general to the specific methodology we finally attained the specific model in the case of Pakistan which is given below in equation (4.13)

$$\ln BDM^{SP} = f(\ln GDP, \ln OPENS, COR, \ln PS, \ln LIR, \ln GS) \dots\dots\dots (4.13)$$

4.4.2 General to Specific Modeling in case of India

We have applied the GTS approach in the case of India to find the appropriate model by incorporating the variables of model two and model five in model one simultaneously. The findings of encompassing methodology show that BDM₁ encompasses BDM₃, BDM₄ BDM₆, BDM₇ while do not encompass BDM₂ and BDM₅. Therefore the general unrestricted model in the case of India is formulated by incorporating the variables of BDM₂, BDM₅, and BDM₁ simultaneously because the predicting power of model two and model five is not present in model one.

$$\ln BDM^{GI} = f(\ln GDP, \ln P, \ln RIR, \ln CA, \ln GEX, UNEMP, \ln GCP, \ln LIR, \ln MS, ER) \dots\dots\dots(4.14)$$

Table 4.8 Steps of General to Specific Model in case of India

Variables	Step:1	Step:2	Step:3	Step:4	Step:5	Step:6	Step:7
L.BD: Log of budget deficit is used as a dependent variable							
Constant	-0.471 (0.650)	-0.498 (0.630)	-0.344 (0.738)	-0.365 (0.721)	1.47 (0.167)	1.73 (0.094)	2.31 ** (0.030)
lnGDP	-0.740 (0.480)	-0.771 (0 .460)	-0.768 (0.460)	-0.771 (0.456)	-2.60 (0.023)	-2.44 (0.029)	-2.78 ** (0.014)
lnP	0.769 (0.464)	0.700 (0.501)	0.771 (0.458)	0.781 (0.451)	1.01 (0.331)	..... .....	..... .....
lnLIR	1.15 (0.283)	0.806 (0.440)	1.68 (0.124)	1.80 (0.100)	1.82 (0.094)	1.59 (0.136)	..... .....
lnMS	0.648 (0.535)	0.788 (0.451)	0.846 (0.417)	0.850 (0.413)	1.23 (0.242)	2.10 (0.056)	2.13** (0.041)
ER	-0.261 (0.800)	-0.390 (0.705)	-0.286 (0.780)	..... .....	..... .....	..... .....	..... .....
lnRIR	0.147 (0.886)	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....
lnCA	-0.398 (0.701)	0.544 (0.599)	0.409 (0.691)	0.423 (0.680)	..... .....	..... .....	..... .....
lnGEX	-1.57 (0.155)	0.405 (0.695)	0.856 (0.412)	1.34 (0.208)	1.54 (0.150)	2.02 (0.064)	2.50 ** (0.025)
UNEMP	-1.25 (0.245)	-0.378 (0.714)	..... .....	..... .....	..... .....	..... .....	..... .....
lnGCP	0.528 (0.611)	-1.09 (0.302)	-1.10 (0.298)	-1.14 (0.278)	-1.10 (0.293)	-2.75 (0.016)	-2.28 ** (0.038)
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at 10% (p<0.1) and P.values are given in the parentheses.							

In the above table, we have performed the general to specific methodology to find the specific model in the case of India. We have dropped the insignificant variables based on p & t value to get the appropriate model. On the insignificant variable, we have imposed the restriction either this variable has an impact or no on the outcome variable. As in the first model, we dropped the lnRIR because its p-value was too high, and imposing restriction shows that it has no impact on the outcome variable. Likewise, we have dropped the variables i.e. UNEMP, ER, lnCA, lnP, and LIR one by one on the above-discussed criteria. We have dropped the all insignificant variables one by one until we get the appropriate model with significant P.values.

Table 4.9 Insignificant variables in the general model in the case of India

Steps	Variables	Exclusion restriction test	Remarks
Step 1	lnRIR	1.5722 (0.245)	Excluded
Step 2	UNEMP	0.1427 (0.714)	Excluded
Step 3	ER	0.45177 (0.652)	Excluded
Step 4	lnCA	0.17912 (0.680)	Excluded
Step 5	lnP	1.0247 (0.331)	Excluded
Step 6	lnLIR	2.5168 (0.517)	Excluded

After applying the encompassing approach and general to the specific methodology we finally attained the specific model in the case of India having significant p-values which are given below in equation (4.15)

$$\ln BDM^{SI} = f(\ln GDP, \ln MS, \ln GEX, \ln GCP) \dots\dots\dots (4.15)$$

4.4.3 General to Specific Modeling in case of Bangladesh

We have employed the GTS approach to finding the appropriate model in the case of Bangladesh. To construct the specific model of Bangladesh we incorporate the variables of model one and model seven in model six simultaneously. Briefly, in the case of Bangladesh, the results of the encompassing approach show that BDM₆ has the minimum standard error therefore we consider the BDM₆ as a reference model. The reference model encompasses BDM₂, BDM₃, BDM₄, and BDM₅ while do not encompass the BDM₁ and BDM₇. Consequently, we make a general model in case of Bangladesh by including the variables of BDM₁ and BDM₇ in BDM₆ because their predicting power is not present in the reference model. After constructing the general model through encompassing we check the significance of the variables. In general, the model may be some independent variables ha an insignificant impact on the output variable. Hence, in this case, we omit all variables that have an insignificant impact on the dependent variable.

$$\ln DM^{GB} = f (\ln GDP, \ln P, \ln OPENS, COR, \ln LAW, \ln PS, MP, \ln LIR, \ln MS, ER, \ln GS,$$

POLITY) (4.16)

Table 4.10 Steps of General to Specific Model in case of Bangladesh

Variables	Step:1	Step:2	Step:3	Step:4	Step:5	Step:6	Step:7	Step:8	Step:9
lnBD: Log of the budget deficit is used as a dependent variable									
Constant	0.0211 (0.983)	-0.0941 (0.927)	-0.124 (0.904)	-2.03 (0.073)	-1.62 (0.135)	-2.74 (0.019)	-2.01 (0.017)	-2.47 (0.055)	-2.68 (0.034)* *
lnGDP	0.448 (0.670)	0.461 (0.658)	0.483 (0.501)	1.831 (0.229)	-0.656 (0.526)	-4.22 (0.001)	-3.80 (0.002)	-3.73 (0.002)	-4.39 *** (0.000)
lnP	-0.903 (0.401)	-1.09 (0.313)	-1.18 (0.272)	-1.27 (0.235)	-0.636 (0.539)	.....	.....	.....	.....
lnLIR	-0.147 (0.887)	.....	.....	.....	.....	.....	.....	.....	.....
lnMS	1.98 (0.094)	2.41 (0.046)	2.59 (0.032)	3.90 (0.003)	4.51 (0.001)	4.59 (0.000)	5.13 (0.000)	4.84 (0.000)	4.86 *** (0.000)
ER	-0.655 (0.536)	-0.994 (0.353)	-1.07 (0.315)	-1.19 (0.263)	.....	.....	.....	.....	.....
lnGS	-0.575 (0.585)	-0.656 (0.532)	-0.694 (0.507)	.....	.....	.....	.....	.....	.....
POLITY	-1.28 (0.246)	-1.39 (0.207)	-1.55 (0.160)	-1.55 (0.154)	-1.91 (0.085)	-1.91 (0.082)	-2.00 (0.068)	-2.50 (0.026)	-2.43** (0.029)
lnOPENS	1.09 (0.317)	2.02 (0.083)	2.44 (0.040)	2.41 (0.039)	2.08 (0.064)	2.13 (0.056)	1.32 (0.211)	.....	.....
COR	-1.56 (0.169)	-1.82 (0.110)	-1.95 (0.087)	-1.89 (0.091)	-1.69 (0.121)	-2.29 (0.042)	-1.46 (0.169)	-0.757 (0.462)	.....
lnLAW	-1.40 (0.210)	-2.09 (0.074)	-2.24 (0.055)	-2.30 (0.047)	-2.30 (0.044)	-2.48 (0.030)	-1.93 0.0775	-1.59 (0.135)	-2.45 ** (0.027)
lnPS	0.160 (0.878)	0.104 (0.919)	.....	.....	.....	.....	.....	.....	.....
MP	1.65 (0.150)	1.77 (0.119)	2.00 (0.080)	2.10 (0.065)	1.76 (0.108)	1.74 (0.109)	.....	.....	.....
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at 10% (p<0.1) and P.values are given in the parentheses.									

In table 4.8 we have estimated the general model by using GTS methodology to find the appropriate model based on p and t-value. On the insignificant variables, we have imposed the restriction with the null hypothesis that the variable has an insignificant impact on the output variable. In the first step, we exclude the lnLIR variable based on t and p-value because the p-value is highly insignificant. In the second step, we have excluded the lnPS variable because its p-value is very insignificant means this variable has no impact on the output variable. In the third step, the lnGS variable is highly insignificant and we exclude this variable by imposing the restriction which shows that lnGS has no impact on the budget deficit. Similarly, from fourth to the seventh step we have dropped the other highly insignificant variables i.e ER, lnP, MP, lnOPENS, and COR one by one until we reach with the appropriate model with significant p-values.

Table 4.11 Insignificant Variables in General Model in case of Bangladesh

Steps	Variables	Exclusion restriction test	Remarks
Step 1	lnLIR	0.021749 (0.887)	Excluded
Step 2	lnPS	0.010900 (0.919)	Excluded
Step 3	lnGS	0.48222 (0.5071)	Excluded
Step 4	ER	1.4250 (0.2631)	Excluded
Step 5	lnP	0.40400 (0.5393)	Excluded
Step 6	MP	3.0337 (0.1094)	Excluded
Step7	lnOPENS	1.7448 (0.2112)	Excluded
Step8	COR	0.57355 (0.4624)	Excluded

After applying the encompassing approach and general to the specific methodology we finally attained the specific model in the case of Bangladesh which is given below in equation (4.17)

$$\ln BDM^{SB} = f(\text{L.GDP, lnMS, POLITY, lnLAW}) \dots\dots\dots (4.17)$$

4.4.4 General to Specific Modeling in case of Sri Lanka

In the case of Sri Lanka, the results of the encompassing approach show that BDM₇ has the minimum standard error therefore we consider the BDM₇ as a reference model. The reference

model encompasses BDM₂, BDM₃, BDM₄, and BDM₆ while do not encompass the BDM₁ and BDM₅. Consequently, we make a general model in the case of Sri Lanka by including the variables of BDM₁ and BDM₅ in BDM₇ because their predicting power is not present in the reference model. After constructing the general model through encompassing we check the significance of the variables. In general, the model may be some independent variables ha an insignificant impact on the output variable. Hence, in this case, we omit all variables that have n ainsignificant impact on the dependent variable.

$$\ln DM^{GS} = f(\ln GDP, \ln P, \ln LIR, \ln MS, ER, \ln RIR, \ln CA, \ln OPEN, COR, \ln LAW, \ln PS, MP) \dots\dots\dots (4.18)$$

Table 4.12 Steps of General to Specific model in case of Sri Lanka

Variables	Step:1	Step:2	Step:3	Step:4	Step:5	Step:6	Step:7	Step:8	Step:9	Step:10
lnBD: Log of the budget deficit is used as a dependent variable										
Constant	2.914 (0.001)	2.9137 (0.001)	3.238 (0.001)	4.256 (0.002)	-4.354 (0.004)	-6.035 (0.007)	-2.423 (0.042)	-0.13 (0.07)	-0.776 0.4508	1.98** (0.04)
lnGDP	-2.35 (0.057)	-2.54 (0.038)	-2.79 (0.023)	-2.68 (0.025)	-1.86 (0.092)	-1.27 (0.229)	-1.872 (0.180)	-2.05 (0.08)	-2.08 (0.02)	-3.3*** (0.00)
lnP	-2.23 (0.067)	-2.41 (0.047)	-2.71 (0.026)	-2.59 (0.029)	-1.79 (0.102)	-1.18 (0.26)	..... .....	..... .....	..... .....	..... .....
lnLIR	0.224 (0.829)	0.242 (0.815)	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....
lnMS	-2.30 (0.061)	-2.48 (0.042)	-3.13 (0.014)	-3.17 (0.011)	-2.71 (0.021)	-2.32 (0.040)	-1.98 (0.071)	-1.66 (0.12)	-1.72 (0.10)	..... .....
ER	0.384 (0.928)	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....
RIR	0.801 (0.453)	0.866 (0.415)	0.900 (0.394)	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....
lnCA	2.45 (0.049)	2.65 (0.032)	3.00 (0.017)	2.91 (0.017)	2.13 (0.059)	1.57 (0.145)	1.08 (0.30)	..... .....	..... .....	..... .....

lnOPEN	-1.93 (0.101)	-2.09 (0.075)	-2.26 (0.053)	-2.10 (0.065)	-1.38 (0.199)	.....	.....	.....	.....	.....
COR	4.22 (0.005)	4.56 (0.002)	4.98 (0.001)	4.95 (0.000)	4.48 (0.001)	4.23 (0.001)	4.08 (0.001)	4.07 (0.00)	4.22 (0.00)	3.89** (0.00)
lnLAW	-1.72 (0.137)	-1.85 (0.106)	-1.96 (0.086)	-1.76 (0.112)	.....	.....	.....	.....	.....	.....
lnPS	3.07 (0.022)	3.31 (0.012)	3.82 (0.005)	3.78 (0.004)	3.41 (0.006)	3.53 (0.004)	3.31 (0.006)	3.13 (0.00)	3.25 (0.00)	2.61** (0.01)
MP	-2.46 0.0489	-2.66 (0.032)	-3.03 (0.016)	-2.95 (0.016)	-2.16 (0.055)	-1.61 (0.135)	-1.11 (0.287)	-0.74 (0.46)	.....	.....
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at 10% (p<0.1) and P.values are given in the parentheses.										

In table 4.10 we have estimated the general model by using GTS methodology to find the appropriate model based on p and t-value. On the insignificant variables, we impose the restriction, with the null hypothesis that the variable has an insignificant impact on the output variable. In the first step, we exclude the ER variable based on t and p-value because the p-value is highly insignificant. In the second step, we have excluded the lnLIR because its p-value is very high which is insignificant means this variable has no impact on the output variable. In the third step, the RIR variable is highly insignificant and we exclude this variable by imposing the restriction which shows that RIR has no impact on the budget deficit. Similarly, from forth to the seventh step we have dropped the other highly insignificant variables one by one until we reach with the appropriate model with significant p-values.

Table 4.13 Insignificant variables in the general model in case of Sri Lanka

Steps	Variables	Exclusion restriction test	Remarks
Step 1	ER	0.00000 (1.0000)	Excluded
Step 2	lnLIR	0.058742 (0.8154)	Excluded
Step 3	RIR	0.81044 (0.3943)	Excluded
Step 4	lnLAW	3.0887 (0.1127)	Excluded
Step 5	lnOPEN	1.8919 (0.1990)	Excluded
Step 6	lnP	1.3948 (0.2625)	Excluded
Step 7	lnCA	1.1637 (0.3019)	Excluded
Step 8	MP	0.55885 (0.4680)	Excluded
Step 9	lnMS	2.9508 (0.1079)	Excluded

After applying the encompassing approach and general to the specific methodology we finally attained the specific model in the case of Sri Lanka which is given below in equation (4.19)

$$\ln BDM^{SS} = f(\ln GDP, COR, \ln PS) \dots\dots\dots (4.19)$$

Table 4.14 Summary of Models

Country	General Unrestricted Model	Specific Model
Pakistan	$\ln BDM^{GP} = f(\ln GDP, \ln P, \ln OPENS, COR, \ln LAW, \ln PS, MP, \ln LIR, \ln MS, ER, \ln GS, POLITY)$	$\ln BDM^{SP} = f(\ln GDP, \ln OPENS, COR, \ln PS, \ln LIR, \ln GS)$
India	$\ln BDM^{GI} = f(\ln GDP, \ln P, \ln RIR, \ln CA, \ln GEX, UNEMP, \ln GCP, \ln LIR, \ln MS, ER)$	$\ln BDM^{SI} = f(\ln GDP, \ln MS, \ln GEX, \ln GCP)$
Bangladesh	$\ln BDM^{GB} = f(\ln GDP, \ln P, \ln OPENS, COR, \ln LAW, \ln PS, MP, \ln LIR, \ln MS, ER, \ln GS, POLITY)$	$\ln BDM^{SB} = f(\ln GDP, \ln MS, POLITY, \ln LAW)$
Sri Lanka	$\ln BDM^{GS} = f(\ln GDP, \ln P, \ln LIR, \ln MS, ER, \ln RIR, \ln CA, \ln OPEN, COR, \ln LAW, \ln PS, MP)$	$\ln BDM^{SS} = f(\ln GDP, COR, \ln PS)$

In the above section first, we apply the encompassing approach and have found the reference model in the case of each selected South Asian country. Then on the base of this reference model, we have encompassed the remaining models. The models of the budget deficit that do not encompass the reference model we incorporate these models in the reference model and construct the general unrestricted model in the case of each country. After constructing the

general models which have both significant and insignificant variables we have employed the general to specific (GTS) methodology to find the appropriate model. In this process the variables that were insignificant we imposed the restriction through the exclusion restriction test and omit them if they have no impact on the outcome variable. We repeat this procedure again and again until we attained the specific model of BD for the country.

4.5 Augmented Dickey-Fuller (ADF) Test of Unit Root

Before any empirical analysis, it is required to apply the co-integration approach to check the order of the integration of the series. In another scenario when there is a problem of unit root then if we run the analysis it will give us meaningless and spurious results. To check the stationarity of the data which is in the log form we have employed the Augmented Dickey-Fuller (ADF) test of a unit root. The results of the ADF unit root tests for Pakistan, India, Bangladesh, and Sri Lanka are given below.

Table 4.15 ADF Unit Root Test Results in case of Pakistan

Level				
Variables	Constant, Trend	Lags	ADF, P-Value	Decision
lnBD _t	C, t	0	-1.532 (0.518)	Non-Stationary
lnGDP _t	C, t	0	-1.012 (0.164)	Non-Stationary
lnOPEN _t	C, t	0	-1.004 (0.045)	Stationary
COR _t	C, t	0	-1.107 (0.037)	Stationary
PS _t	C, t	1	-1.206 (0.123)	Non-Stationary
lnGS _t	C, t	0	-1.344 (0.367)	Non-Stationary
lnLIR _t	C, t	0	-0.760 (0.229)	Non-Stationary
First Difference				
Variables	Constant, Trend	Lags	ADF, P-Value	Decision
ΔlnBD _t	NO C, t	0	-6.724 (0.000)	Stationary
ΔlnGDP _t	NO C, t	0	-1.872 (0.040)	Stationary
ΔPS _t	NO C, t	0	-3.499 (0.008)	Stationary
ΔlnGS _t	NO C, t	0	-5.492 (0.000)	Stationary
ΔlnLIR _t	NO C, t	0	-3.586 (0.008)	Stationary
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at 10% (p<0.1) and P.values are given in the parentheses.				

Table 4.15 shows the result of the Augmented Dickey-Fuller (ADF) test in the case of

Pakistan which we have employed to explore the order of the integration of variables i.e lnBD,

lnGDP, lnOPEN, lnCOR, PS, lnGS, and lnLIR. At the level, we cannot reject the null hypothesis “series is non-stationary” in case of lnBD, lnGDP, PS, lnGS, and lnLIR whereas we can reject the null hypothesis in case of lnOPEN and lnCOR means both are stationary at level. In other words, we can say that lnBD, lnGDP, PS, lnGS, and lnLIR are integrating of order one I(1) while lnOPEN and lnCOR are integrating of order zero I(0). At the first difference, all variables are stationary at 1% and a 5% significance level means these variables are mixed order of integration. Hence in this phenomenon, we can apply the Autoregressive distributed lag (ARDL) bound testing approach to explore the long-run relationship among the variables.

Table 4.16 ADF Unit Root Test Results for India

Level				
Variables	Constant, Trend	Lags	ADF, P-Value	Decision
lnBD _t	C, t	0	-1.447 (0.987)	Non-Stationary
lnGDP _t	C, t	0	1.447 (0.916)	Non-Stationary
lnMS _t	C, t	0	-0.815 (0.213)	Non-Stationary
lnGEX _t	C	0	-2.537 (0.111)	Non-Stationary
lnGCP _t	C, t	0	-2.177 (0.179)	Non-Stationary
First Difference				
Variables	Constant, Trend	Lags	ADF, P-Value	Decision
ΔlnBD _t	NO C, t	0	-3.294 (0.015)	Stationary
ΔlnGDP _t	NO C, t	0	-3.493 (0.008)	Stationary
ΔlnMS _t	NO C, t	0	-5.720 (0.000)	Stationary
ΔlnGEX _t	NO C, t	0	-5.240 (0.000)	Stationary
ΔlnGCP _t	C	0	-1.477 (0.016)	Stationary
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1). P.values are given in the parentheses.				

The results of the augmented Dickey-Fuller (ADF) test show that all variables i.e lnBD, lnGDP, lnMS, lnGEX, and lnGCP are non-stationary at the level while stationary at the first difference. In other words, all the variables have unit root means non-stationary at the level and stationary at the first difference. Hence, we can conclude based on the unit root test

results that all series are non-stationary at the level. However, we can conclude that all variables are integrating the same order I(1) then in this case we can apply the vector error correction (VECM) model to explore the long term connection and the direction of the causality among the selected set of variables.

Table 4.17 ADF Unit Root Test Results for Bangladesh

Level				
Variables	Constant, Trend	Lags	ADF, P-Value	Decision
lnBD _t	C, t	0	-1.780 (0.7146)	Non-Stationary
lnGDP _t	C, t	0	4.991 (0.999)	Non-Stationary
lnMS _t	NO C,t	0	-3.862 (0.002)	Stationary
POLITY _t	NO C, t	0	-3.862 (0.002)	Stationary
lnLAW _t	C, t	0	-1.612 (0.477)	Non-Stationary
First Difference				
Variables	Constant, Trend	Lags	ADF, P-Value	Decision
ΔlnBD _t	NO C, t	0	-4.544 (0.000)	Stationary
ΔlnGDP _t	C, t	1	-1.691 (0.0431)	Stationary
ΔlnMS _t	NO C, t	0	-6.365 (0.000)	Stationary
ΔPOLITY _t	NO C, t	0	-6.365 (0.000)	Stationary
ΔlnLAW _t	NO C, t	0	-2.419 (0.014)	Stationary
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1) and P.values are given in the parentheses.				

Unit root approach results for Bangladesh show that at the level lnBD, lnGDP and lnLAW are non-stationary while POLITY and MS are stationary at the level. After first difference the whole series become stationary. Furthermore, when we take the first difference then all variables i.e budget deficit, gross domestic product, money supply, POLITY and law and order become stationary at zero lag except GDP which stationary with one lag. Finally, we can say that the variables are mix order of integration I(1) and I(0). Hence, in this scenario we can use the Autoregressive Distributed Lag (ARDL) Bound testing methodology to explore the co-integration among the variables.

Table 4.18 ADF Unit Root Test Results for Sri Lanka

Level

Variables	Constant, Trend	Lags	ADF , P-Value	Decision
lnBD _t	C, t	0	-3.134 (0.984)	Non Stationary
lnGDP _t	C, t	0	-0.039 (0.485)	Non Stationary
COR	C	0	-2.022 (0.031)	Stationary
PS	NO C, t	0	-3.007 (0.034)	Stationary
First Difference				
Variables	Constant, Trend	Lags	ADF , P-Value	Decision
ΔlnBD _t	NO C, t	0	-7.940 (0.000)	Stationary
ΔlnGDP _t	NO C, t	0	-3.788 (0.003)	Stationary
ΔCOR	NO C, t	0	-7.65 (0.000)	Stationary
ΔPS	NO C, t	0	-4.659 (0.000)	Stationary
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1) and P.values are given in the parentheses.				

The outcomes of the unit root procedure for Sri Lanka show that at the level lnBD and lnGDP are non-stationary while corruption and government supply are stationary at the level. After taking the first difference the whole series become stationary. Furthermore, when we take the first difference then all variables i.e budget deficit, gross domestic product, corruption and government stability become stationary at with zero lag. Finally, we can say that the variables are mix order of integration I(1) and I(0). Hence, in this scenario we can use the Autoregressive Distributed Lag (ARDL) Bound testing approach to explore the con-integration association among the variables.

4.6 Johansen and Juselius (1990) Co-integration Procedure Results for

India

Unit root results confirm that all variable have unit root at the level and become stationary after taking the first difference. In other words we can say that all the variables are integrating of order one I(1). In this phenomenon, we can check the long run link among the selected set of variables i.e lnBD, lnGDP, lnMS, lnGEX and lnGCP by using the Johansen Juselius co-integration approach

Table 4.19: Unrestricted Co-integration Rank Test for India

Co-Integration Rank Test (Trace)			
Hypothesized No. of CE(s)	Trace Statistics	Critical Value	P-value
None	145.5297	69.81889	(0.000)
At most 1	58.5213	47.85613	(0.003)
At most 2	27.5452	29.79707	(0.089)
At most 3	9.053328	15.49471	(0.361)
At most 4	0.081663	3.841466	(0.775)
Co-Integration Rank Test (Maximum Eigenvalue)			
None	87.00845	33.87687	(0.000)
At most 1	30.97604	27.58434	(0.017)
At most 2	18.49191	21.13162	(0.112)
At most 3	8.971665	14.26460	(0.288)
At most 4	0.081663	3.841466	(0.775)
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1) and P.values are given in the parentheses.			

Before the Co-integrations analysis we have checked the lag of the series taking at their level. We have used the lag selection criteria recommended through literature i.e SIC and the AIC to select the optimal lag length which can be obtained by minimizing the concerned criteria's. Finally these results have suggested almost 1 or two lags for different models which we used in the below analysis of different countries.

The above Table 4.19 shows the result of unrestricted co-integration approach in case of India where all variables having unit root at the level and stationary at the first difference.

According to Johansen co-integration approach the null hypothesis tells us that none-of the equation is integrated, at most one equation is co-integrated; at most two equations are co-integrating and so on. In case of both maximum Eigen value and the trace test we can reject to the null hypothesis that none of the equations is co-integrated. Furthermore, we also cannot reject to the null hypothesis (H_0) for last two equations because p-value is more than .05 percent, which means in this model the variables have long run association. This test shows the long run association among the selected variables exists so we can move towards the Vector Error Correction (VECM) Model because the model has more than on co-integrating equations.

Table 4.20 VECM Granger Causality Results for India

Short Run Causality						Long Run Causality
	$\Delta \ln BD$	$\Delta \ln GDP$	$\Delta \ln MS$	$\Delta \ln GEX$	$\Delta \ln GCP$	ECT
$\Delta \ln BD$		3.374**	6.7221***	9.048***	9.304**	-2.345123***
		(0.041)	(0.009)	(0.003)	(0.003)	(0.000)
$\Delta \ln GDP$	3.7979**		0.1305	1.0318	0.0775	-1.342118***
	(0.050)		(0.7179)	(0.780)	(0.309)	(0.000)
$\Delta \ln MS$	0.1587	0.5135		3.4721**	7.048**	-0.943964***
	(0.690)	(0.473)		(0.043)	(0.033)	(0.000)
$\Delta \ln GEX$	3.4571**	4.1931**	0.1262		4.3752**	1.024371*
	(0.043)	(0.046)	(0.722)		(0.021)	(0.071)
$\Delta \ln GCP$	6.3752**	0.0553	2.1315**	5.2409**		-0.479559***
	(0.011)	(0.814)	(0.046)	(0.013)		(0.000)

Here, ***, **, *, indicates significance at 1% ($P < 0.01$), at 5% ($p < 0.05$) and at the 10% ($p < 0.1$) and P.values are given in the parentheses.

In VECM methodology the direction of the causality between $\ln BD$, $\ln GDP$, $\ln GEX$ and $\ln GCP$ is to be tested. When the co-integration is present among the selected variables, it means that the long-term connection exists. Moreover, the causal association exists among variables at least one direction (Engle & Granger, 1987; Oxley & Greasley, 1998). In this section, we have

employed the VECM Granger causality approach in order to test the direction of the causality among the variables in case if India and the outcomes of this model are given in the above table.

In the above table the outcomes shows the long run connection among the variables and also shows the bi-directional causality among the variables in all equations when we are taking each independent variable as a dependent variable one by one. Furthermore the ECT term is also negative and highly significant. The co-efficient of the ECT term indicates in which speed the system of the interconnected variables be returned back towards long-run equilibrium. Moreover, the two way causality exist between budget deficit and the economic growth, MS and GEX and GCP and money supply means both leads to each other. Furthermore, the uni-directional causality is running from BD to MS, GEX and GCP and from GEX to GDP.

Table 4.21 ARDL Bound Testing Approach Results to Check the Co-integration for Pakistan

ARDL (1,0,0,0,0 ,1,0) Long Run Bound testing results			
Variable	Co-efficient		P-value
C	1.712668		(0.604)
L_BD(-1)	-0.162492		(0.428)
L_GDPPC	-3.09505***		(0.004)
L_GS	3.736816***		(0.008)
L_LIR	-4.906833***		(0.000)
L_OPEN	3.825012**		(0.012)
PS	-0.151581***		(0.002)
PS(-1)	0.063045*		(0.070)
COR	1.447122***		(0.000)
ECM Regression/ARDL (1,0,0,0,0 ,1,0) Error Correction Regression (Restricted Constant & no Trend)			
D(L_BD(-1))	0.580033***		(0.005)
D(L_GS)	2.054052***		(0.002)
D(L_LIR)	-8.464613***		(0.000)
D(L_OPEN)	5.509386***		(0.000)
D(COR)	1.291249***		(0.000)
ECT(-1)	-0.485523***		(0.000)
F-Bound Test			
F-statistic	I(0)	I(1)	Signif.
13.452	1.99	2.94	10%
-----	2.27	3.28	5%

-----	2.88	3.99	1%
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1). P.values are given in the parentheses.			

The consequences of the ARDL bound testing approach show that the government size has a positive impact on the BD which indicates that the higher government expenditures and the larger cabinet size continuously become bias the rising the budget deficit. As we know that Pakistan has a large cabinet size approximately having 90 members and its high expenses responsible for the rising budget deficit.

The co-efficient of GDP is negative and statistically significant. These results are similar to the Neoclassical School proposition. The fact that GDP is negatively associated with the budget deficit shows that increasing budget deficit may hamper the growth of the economy for Pakistan. Furthermore, trade openness has a positive and impact on BD. Trade opens reveals the exposure of any economy to external ups and downs (shocks) that increase the BD. However, in the developing countries fluctuations in the prices of exports and imports may influence the balance of trade through export tariff and import prices. These results are in line with the Fatás and Mihov (2003) and Agnello and Sousa (2009) both confirmed the positive relationship between BD and the trade openness. The co-efficient of political stability is negative and highly significant which indicates that if the institutions are strong and the economy is politically stable then it will reduce the budget deficit. Moreover, corruption has a positive and impact on BD.

Similarly, the co-efficient of the ECT term for Bangladesh is negative and significant with value -0.485523, which means that 48.55 % deviation from the equilibrium in the long-run can be adjusted within one year. The co-efficient of the ECT term is relatively low which indicates that long-run equilibrium could be gradually adjusted through the short-run dynamics.

Similarly, the numeric of F-bound is also more than the upper bound value which also provides evidence of the long-run association.

Table 4.22 ARDL Bound Testing Approach Results to Check the Co-integration for Bangladesh

ARDL (2,0,1,2) Long Run Bound testing results			
Variable	Co-efficient	P-value	
C	-3.392058	(0.078)	
L_BD(-1)	-0.604446	(0.072)	
L_GDP	0.932883	(0.930)	
L_GDP (-1)	-7.342664	(0.540)	
L_LAW	-1.025880	(0.041)	
L_LAW(-1)	0.381817	(0.515)	
L_MS	0.530759	(0.028)	
L_MS(-1)	3.452094	(0.047)	
POLITY	-1.540214	(0.027)	
D(POLITY)	-2.111183	(0.041)	
ECM Regression/ARDL (2,0,1,2) Error Correction Regression (Restricted Constant & no Trend)			
D(L_GDP)	0.932883	(0.529)	
D(L_LAW)	-1.025880	(0.002)	
D(L_MS)	-0.530759	(0.388)	
D(POLITY)	-1.540214	(0.000)	
ECM (-1)	-0.604446	(0.000)	
F-Bound Test			
F-statistic	I(0)	I(1)	Signif.
5.9500	2.2	3.09	10%
-----	2.56	3.49	5%
-----	3.29	4.37	1%
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1). P.values are given in the parentheses.			

The results in the case of Bangladesh in the above table show that the impact of law and order on BD is negative which indicates that the weak institutions are the key reason for mismanagement which leads to the higher BD. In the above outcomes, the co-efficient of the law and order is negative and significant which indicates that strong law and order create a situation where the fiscal authorities feel better to change the fiscal conditions that indirectly reduce to the BD (Fatás & Mihov, 2003). For POLITY we used the good governance indicator which has a

negative impact on the BD. It indicates that lack of good governance, in the long run, will increase the deficits in the budget. In other words, we can say that if there is high transparency and the institutions are too strong then it indicates the pure democracy which ultimately reduces the budget deficit. The GDP has a positive impact on BD which shows that if GDP increased then the budget deficit will also increase the same results have also been found by Murwirapachena *et. al.* (2013) that economic growth has a positive association with the budget deficit. Budget deficit reduces the real GDP growth which leads to inflation and money supply and ultimately raises the GDP.

Moreover for Bangladesh, the co-efficient of ECT term is negative and statistically significant with value -0.604446, which means that 60.44 % deviation in the long-run from the equilibrium can be adjusted with one year. The co-efficient of the ECT term is relatively low which indicates that the long-run equilibrium adjusted gradually by the short-run dynamics. Likewise, the value of the F-bond is also greater than the upper bound value which provides the evidence that long-run association exists among the variables.

Table 4.23 ARDL Bound Testing Approach Results to Check the Co-Integration for Sri Lanka

ARDL (2,0,1,2) Long Run Bound testing results		
Variable	Co-efficient	P-value
L_BD(-1)	-0.423974*	(0.073)
L_GDP	-0.158750***	(0.000)
PS(-1)	0.021378	(0.113)
COR(-1)	0.235498***	(0.004)
D(L_BD(-1))	-0.380559**	(0.013)
D(PS)	0.059133***	(0.000)
D(COR)	0.455062***	(0.000)
D(COR(-1))	0.124409***	(0.008)
ECM Regression/ARDL (2,0,1,2) Error Correction Regression (Restricted Constant & no Trend)		
D(L_BD(-1))	-0.380559***	(0.000)
D(PS)	0.059133***	(0.000)
D(COR)	0.455062***	(0.000)
D(COR(-1))	0.124409***	(0.000)

ECT(-1)	-0.423974***	(0.000)	
F-Bound Test			
F-statistic	I(0)	I(1)	Signfi.
10.6621	2.01	3.1	10%
-----	2.45	3.63	5%
-----	3.42	4.84	1%
Here, ***, **, *, indicates significance at 1% (P<0.01), at 5% (p<0.05) and at the 10% (p<0.1). P.values are given in the parentheses			

Political stability has a positive link with the BD which shows that the higher level of political stability and more democracy help to reduce the budget deficit. These findings support the results of Fatás and Mihov (2003) that a positive relationship exists between political stability and BD. GDP has a negative and significant impact on the BD which means that when an economy grows it will lead to a reduction in the BD. These outcomes are similar to (Farajova, 2011). Corruption is positively associated with BD and also significant means of rising corruption in the public sector will lead to more deficits in the budget.

Moreover, the co-efficient of the ECT term for Bangladesh is negative and significant with value -0.423974 which means that 42.39 % deviation from equilibrium in the long-run can be adjusted with one year. Likewise, the co-efficient of the ECT term is relatively low which indicates that equilibrium in the long-run is gradually adjusted through the short-run dynamics. Likewise, the value of the F-bond is also more than the value of the upper bound which also indicates that long-run association exists among the selected variables.

Dia

4.7 Diagonistic tests

The results of the diagonists tests Breusch Paggon and Godfery (1981) LM test of no serial correlation, Engle’s (1982) ARCH test of the no ARCH effect and Jarque-Bera test for normality

are given in below tables 4.24 and 4.25 which shows that there is no auto-correlation, no ARCH effect and data is also normally distributed.

Table 4.24 Results of the Diagnostic Tests

Countries	LM test			ARCH test		
	$\chi^2_{(1)}$	P-value	Comments	$\chi^2_{(1)}$	P-value	Comments
Pakistan	2.1704	(0.3378)	No Auto-Correlation	1.048	(0.306)	No-arch effect
India	2.602	(0.272)	No Auto-Correlation	1.668	(0.196)	No-arch effect
Bangladesh	2.239	(0.326)	No Auto-Correlation	2.114	(0.145)	No-arch effect
Sri-Lanka	4.382	(0.111)	No Auto-Correlation	0.002	(0.961)	No-arch effect

Table 4.25 Results of J.B test

Countries	J-Berra test		Comments
	$\chi^2_{(1)}$	P-value	
Pakistan	0.265	(0.875)	Normally-distributed
India	1.249	(0.535)	Normally-distributed
Bangladesh	3.380	(0.184)	Normally-distributed
Sri-Lanka	0.589	(0.745)	Normally-distributed

Chapter 5

Conclusion and Policy Recommendations

5.1 Introduction

The main objective of the study is to choose the appropriate model of the budget deficit for South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka from seven selected non-nested models by using the encompassing methodology and also form the specific and appropriate model by using general to specific (GTS) methodology. The second objective is to explore the long-run and short-run association between budget deficit and its determinants. For this purpose, this study has compared the seven non-nested models by using encompassing techniques develop by Harvey *et. al.* (1998) for the South Asian countries i.e Pakistan, India, Bangladesh, and Sri Lanka. The encompassing methodology attempts to extract the best model among a class of models.

For this purpose, this study has taken the seven non-nested models from the previous literature used by different researchers for empirical analysis. On these seven models, we have employed the encompassing approach and have found the reference model in the case of each selected South Asian country. Then on the base of this reference model, we have encompassed the remaining models. The models of the budget deficit that do not encompass the reference model we incorporate these models in the reference model and construct the general unrestricted model in case of each country i.e Pakistan, India, Bangladesh, and Sri Lanka. After constructing the general models which have both significant and insignificant variables we have employed the general to specific (GTS) methodology to construct the appropriate model. In this process the variables that were insignificant we imposed the restriction through the exclusion restriction test and omit them if they have no impact on the outcome variable. We repeat this procedure again and again until we attained the specific model of the budget deficit in the case of each country i.e Pakistan, India, Bangladesh, and Sri Lanka.

5.2 Conclusion

The results of the Augmented Dickey-Fuller test in case of Pakistan which we have employed to check the order of the integration of series i.e lnBD, lnGDP, lnOPEN, lnCOR, PS, lnGS and lnLIR. At level “the series is non-stationary” in case of lnBD, lnGDP, PS, lnGS, and lnLIR while stationary in lnOPEN and lnCOR means both are stationary at level. In the case of India, all variables i.e lnBD, lnGDP, lnMS, lnGEX, and lnGCP are non-stationary at the level while become stationary after taking the first difference. In other words, all variables are integrating order one means non-stationary at the level and stationary at the first difference.

The outcomes of the unit root methodology in the case of Bangladesh show that at the level lnBD, lnGDP and lnLAW are non-stationary while POLITY and money supply are stationary at the level. By taking the first difference the whole series becomes stationary. While the outcomes of the ADF for Sri Lanka show that at the level lnBD and lnGDP are non-stationary while corruption and government supply are stationary at the level. After the first difference, the whole series becomes stationary. Finally, the whole series is a mixed order of integration I(1) and the I(0).

In VECM methodology the direction of the causality association between the variables i.e lnBD, lnGDP, lnGEX, and lnGCP is to be tested in the time series context. Moreover, the causal association exists among variables at least in one direction (Engle & Granger, 1987; Oxley & Greasley, 1998). The results show the long-run relationship among the variables and also shows the bi-directional causality among the variables in all equations when we are taking each independent variable as a dependent variable one by one. Furthermore, ECT terms are also negative and highly significant. In other words, we can also say that the co-efficient of the ECT term indicates in which speed the system of the interconnected variables is returned towards

long-run equilibrium. The bi-directional causality association exists between the budget deficit and the economic growth, MS and GEX, and GCP and money supply mean both leads to each other. Furthermore, the uni-directional causality is running from BD to MS, GEX, and GCP and from GEX to GDP.

The outcomes of the ARDL bound testing approach show that the impact of the government size is positive and statistically significant which indicates that the higher government expenditures and the larger cabinet size continuously become bias the rising the budget deficit. As we know that Pakistan has a large cabinet size i.e (up to 90 members) and its high expenses responsible for raising the budget deficit.

The co-efficient of GDP is negative and significant. This negative relationship shows that increasing budget deficit may hamper the economic growth for Pakistan. Furthermore, trade openness has a positive impact on the budget deficit (BD) which shows the exposure of any economy to external ups and downs (shocks) that increase the budget deficit Co-efficient of the political stability is negative and highly significant which indicate that if the institutions are strong and economy is politically stable then it will reduce the budget deficit. Corruption is positively associated with BD. Similarly, the value of the F-bound is also higher than the upper bound value which also provides evidence of the long-run connection among the series.

The consequences in case of the Bangladesh show that the impact of law and order on BD is negative and significant which indicates that weak institutions are the key reason for mismanagement which leads to a higher budget deficit. POLITY we used the good governance indicator which has a negative and a significant impact on the BD which indicates that in the long run lack of good governance will raise the BD. If GDP increased then the budget deficit will also increase the same results have also been found by Murwirapachena *et. al.* (2013) that

economic growth has a positive association with the budget deficit. Budget deficit reduces the real GDP growth which leads to inflation and money supply.

However, in the case of Sri-Lanka Political stability shows the positive link with the BD which means that the higher level of political stability and more democracy help to reduce the budget deficit. GDP has a negative and significant impact on the budget deficit which means that when an economy grows it will lead reduction in the budget deficit while corruption has a positive and significant influence on the BD means rising corruption in the public sector will lead to the BD.

Moreover, the value of the co-efficient of ECT term should have a negative sign and statistically significant, the value of the coefficient indicates the speed of adjustment. However, Bangladesh, Pakistan, India, and the Sri Lanka coefficients of the ECT term are negative and statistically significant which means that deviation from equilibrium can be adjusted with one year in the long run. The co-efficient of the ECT term is relatively low which indicates that the dynamics in the short run gradually adjust to the long-run balance. Likewise, the value of the F-bond is also higher than the upper-bound value for i.e Bangladesh, Pakistan, India, and Sri Lanka which also provides evidence of the long-run relationship among the series.

5.2 Policy Recommendation

Based on empirical results, we can suggest that that government should improve the quality of the institutions, should also focus on the law and order and political stability that can certainly become a cause to reduce the budget deficit which would boost economic growth. In the case of Pakistan, the government should reduce its cabinet expenditure which will help in reducing the budget deficit.

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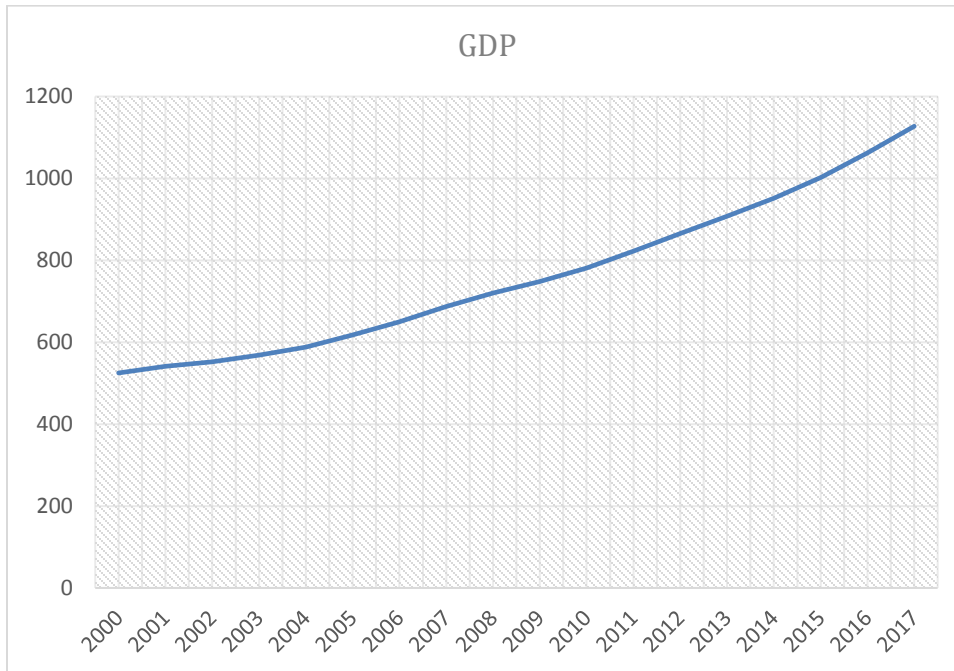
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Appendix

A1. Graphical representation of GDP for Pakistan



A2. Graphical representation of GDP for Pakistan

Lending Interest Rate

