Dynamics of Twin Deficits in South Asian Countries

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Abstract

The study aimed to analyze twin deficit hypothesis in South Asian countries i.e. Bangladesh, India, Pakistan and Sri Lanka. The study also intended to examine the Ricardian Equivalence Hypothesis and Feldstein Horioka Puzzle. For achieving these objectives the study used annual time series data from 1981 to 2014. Autoregressive distributed lag model (ARDL) bound testing approach for cointegration and Granger causality through VAR test have been employed for estimation. Results found no evidence of twin deficit hypothesis in all countries in the long run. While, findings of causality test exhibits no relationship among current account deficit, budget deficit and private saving investment balance except for Bangladesh where bidirectional relationship exists between budget deficit and current account balance in short run. Results support Ricardian equivalence hypothesis only for India and Pakistan while Feldstein Horioka Puzzle is rejected in both these countries implying high international capital mobility and financial integration. The study suggests that in South Asia fiscal and trade sectors reforms and perfect integration of capital markets are required to stabilize the economy.

Keywords: Twin Deficit, Ricardian Equivalence, Feldstein Horioka Puzzle, ARDL, South Asia

JEL: C32, E21, F32, O53

1. Introduction

The phenomenon of twin deficits has always been remained major concern for all the economies of the world for being the major hurdle in the growth performance of their economies. The twin deficits hypothesis postulates that an increase in government budget deficit will eventually leads to the current account deficit. More than two decades ago, a number of economies have started to take measures and structural reforms to ensure macroeconomic stability by getting rid of all the major ills of the economy including large and persistent deficits (Bluedorn and Leigh, 2011). Despite the reforms, fiscal and current account imbalances continued to persist because governments in many developing countries were struggling hard due to the macroeconomic volatility and external shocks. The presence of persistent deficits both in developed and developing countries demands for re-examining the twin deficits hypothesis to ensure macroeconomic stability by improving the performance of both internal and external sectors.

Various channels explaining the possible link between budget deficit and current account deficit have been described by two theories. The first theory follows the Keynesian school of thought (1936) according to which an increase in budget deficit will enhance the national income and consumption spending (an extension of aggregate demand) and further depreciation of current account deficit will be caused by the increased amount of imports. The second theory is based on Mundell–Fleming model (1968, 1962) which states that growing budget deficit raises the interest rates, generates more financial inflows and appreciates the exchange rate and hence results in worsening of the current account deficit. The theory of Ricardian Equivalence Hypothesis (REH) contradicts the twin deficits hypothesis by arguing that the budget deficit has no causal relationship with current account deficit. Barro (1974, 1989) inspected the theoretical validity of Ricardian equivalence hypothesis through an overlapping generation's model and concluded that the level of aggregate demand and interest rate does not change by financing of budget deficits either through taxes or borrowing. The twin deficits phenomenon is also related to Feldstein Horioka Puzzle (1980) which states that the degree of international capital mobility is explained by the association between savings and investment. The lack of capital mobility is attributed to the strong association between savings and investment and vice versa. In this era of globalization, the dilemma of twin deficits and capital market integration phenomenon especially in many developing countries have become major challenge that how these countries are taking

measures to reduce and prevent the re-emergence of fiscal and current account deficits and to what extent their capital markets are integrated with other markets to promote economic growth.

There has been an increasing concern to resolve the problem of twin deficits for setting the path towards macroeconomic stability and economic growth. Policy makers have always remained interested in examining the possible relationship between fiscal and current account deficits. The literature regarding twin deficits and Ricardian equivalence hypothesis is divided in two strands. The first strand found that budget deficit has positive and significant relationship with current account deficit (twin deficits), following the Keynesian school of thought (Vamvoukas, 1999; Aqeel et al., 2000; Akbostanci and Tunc, 2002; Fidrmuc, 2003; Saleh et al., 2005; Chowdhury and Saleh, 2007; Acaravci and Ozturk, 2008; Lam, 2012; Kayhan et al., 2013; Catik et al., 2015). The second strand argued against the validity of twin deficits by suggesting no causal relation between budget and current account deficits indicating that Ricardian equivalence hypothesis might be valid in those countries (Basu and Datta, 2005; Javid et al., 2010; Asrafuzzaman et al. 2013). However, few studies found mixed results for the existence of twin deficits and validity of Ricardian equivalence hypothesis (Samadi, 2006; Baharumshah et al., 2009; Magazzino, 2012; Ratha, 2012 and Ravinthirakumaran et al., 2016). The literature regarding twin deficits and Feldstein Horioka puzzle is also divided in two strands. The first strand found low level of international capital mobility due to the strong correlation between savings and investment supporting the Feldstein Horioka Puzzle (Aristovnik, 2005; Lam, 2012; Bagheri et al., 2012). The second strand argued against Feldstein Horioka Puzzle (Fidrmuc, 2003; Marinheiro, 2008; Baharumshah et al., 2009; Aristovnik and Djuric, 2010; Saeed and Khan, 2012).

In sum, the literature provides mixed results for the existence of twin deficits in different countries. But there is limited work in South Asia which has examined the relevance of twin deficits jointly with Ricardian equivalence hypothesis and Feldstein Horioka Puzzle. So the study attempts to fill this gap by re-examining the twin deficits hypothesis along with two other hypotheses i.e. Ricardian equivalence hypothesis and Feldstein Horioka puzzle, with the purpose to investigate either twin deficits or Ricardian equivalence hypothesis exist in South Asia and to examine that to what extent South Asian countries are integrated with other international capital markets. Moreover, mostly the literature does not incorporate the private savings investment balance when estimating the twin deficits model. So it is essential to incorporate this variable in

the model to explore how budget deficit and private savings investment balance affect the current account deficit.

The aim of the study is to analyze the relationship between budget deficit and current account deficit in South Asia (Bangladesh, India, Pakistan and Sri Lanka) from 1981 to 2014. Following are the specific objectives of the study: to investigate the Twin Deficits Hypothesis, to investigate the Ricardian Equivalence Hypothesis, and to investigate the Feldstein-Horioka Puzzle. The study will significantly contribute to the existing literature by providing essential evidence, information and better understanding of twin deficits phenomenon and about the theory of Ricardian equivalence and also enables us to understand that how South Asian countries are integrated in the world market. Various policy implications will also be provided by the study for corporate bodies, researchers, and governments of these countries to ensure macroeconomic stability by getting rid of the twin deficits problem and also to encourage them to increase their capital market integration to promote economic growth in the region.

Following Lam (2012), the theoretical model of the study is based on national income accounting identity. For testing the Ricardian equivalence hypothesis the consumption function specification of Bernheim (1987) has been used, while for estimating the Feldstein Horioka puzzle the econometric model proposed by Fidrmuc (2003) has been followed. The study has used Augmented Dickey Fuller (ADF) and Phillips Perron (PP) unit root tests to evaluate the time series properties of the data. ARDL bound testing framework is used for checking cointegration. The time series data at an annual frequency for South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) has been used in the study. The study has focused on limited number of countries due to data limitations.

The structure of the study is as follows. Previous literature is discussed in section 2. Section 3 presents the Model, methodology and data. The empirical results are provided in section 4. Section 5 contains conclusion and policy recommendations.

2. Literature Review

The existence of twin deficits has always remained highlighted for the role it plays to lessens the sustainability of the economy. The vast literature is available that discussed the relationship between fiscal deficit and current account deficit. Literature is divided into two subsections: first

twin deficits and Ricardian equivalence hypothesis, and second twin deficits and Feldstein Horioka puzzle.

2.1. Literature on Twin Deficits and Ricardian Equivalence Hypothesis

Anoruo and Ramchander (1998) empirically investigated the existence of twin deficits in five Southeast Asian countries. They used annual data from 1957 to 1993 and employed VAR model for estimation. Results showed that only trade deficit caused fiscal deficit in all countries except for Malaysia where bidirectional relationship was found. They concluded that fiscal and trade deficits are effected by various macroeconomic determinants. Vamvoukas (1999) examined the twin deficits in Greece. He used annual data from 1948 to 1994 by employing cointegration technique, ECM and Granger tri-variate causality tests. The results revealed budget deficit has significant impact on trade deficit for long run as well as short run. Thus, it can be concluded that trade deficit can be reduced by decreasing the budget deficit. Aqeel et al. (2000) examined existence of twin deficits in Pakistan for long run as well as short run. They used annual data for the period of 1973 to 1998 and utilized cointegration test, error-correction methodology and Granger trivariate causality tests for estimation. The results found existence of the positive relation in long run and negative relation in short run.

Akbostanci and Tunc (2002) analyzed influence of fiscal deficit on current account deficit for long run as well as short run in Turkish economy. They used quarterly data from 1987 to 2001 and used ECM and Cointegration analysis for estimation. Results found the existence of twin deficits in long run and short run. Hence, Ricardian equivalence hypothesis is rejected for Turkey and twin deficit hypothesis is considered to be valid for Turkish economy. Basu and Datta (2005) empirically investigated the impact of the fiscal deficit on India's external deficit. Authors used quarterly data from 1985 to 2003 and employed cointegration tests for estimation. Results found fiscal deficit and trade deficit are not cointegrated. They concluded that both these deficits and net savings casually preserve the national income identity and the ratio of high fiscal deficit has remained persistent because of the autonomous increase in the saving ratio. It is also found that Indian consumers are not Ricardian. Saleh et al. (2005) investigated the existence of internal and external deficit in Sri Lanka. They used annual data from 1970 to 2003 and adopted ARDL bound test for cointegration. The results supported the Keynesian proposition of twin deficits.

There existed causal link moving from fiscal deficit towards current account deficit. So, policies to reduce fiscal deficit could also be effective in improving the current account deficit.

Saleh (2006) empirically investigated whether there exist any association between budget and trade deficits for Lebanon. He used annual data from 1975 to 2003 and conducted cointegration and Granger causality tests for empirical analysis. Results found evidence in favor of Keynesian proposition and the reversed causal relationship from trade to budget deficit was found. Thus, budget deficit could be eliminated by diminishing the trade deficit. Onafowora and Owoye (2006) analyzed short run and long run causality for budget deficit and trade deficit in Nigeria. They used annual data from 1970 to 2001 by utilizing cointegration estimation technique, ECM and causality analysis. Results supported Keynesian view by refuting the Ricardian equivalence hypothesis. The unidirectional causal relationship was found from trade to budget deficit. Hence, with the help of indirect monetary channels both deficits can be reduced in Nigeria. Samadi (2006) aimed at examining the Keynesian proposition of twin deficit with testing the REH in MENA countries. Annual data from 1971 to 2000 has been employed in the study and cointegration techniques, ECM, and the Granger causality test have been performed. Results found mixed evidence of Ricardian Equivalence and Keynesian view. Therefore, finding of this paper can be helpful in designing the appropriate fiscal policies in MENA countries, especially in Iranian economy.

Lau et al. (2006) estimated twin deficits hypothesis for nine SEACEN economies. They used annual data from 1980 to 2001 and adopted panel cointegration, Granger causality test and dynamic OLS panel VAR for estimation. Results found bidirectional causal relationship between both deficits. However, policy reforms to lessen the fiscal deficit offers opportunity to reduce current account deficit. Chowdhury and Saleh (2008) analyzed the degree of association among internal and external deficit in presence of saving investment gap and free trade in Sri Lanka in long run and short run. The study used data over 1970 to 2005 time period and employed ARDL approach for estimation. The results found evidence in favor of Keynesian view. While, Trade openness also found to be positively but insignificantly affecting current account deficit. It is concluded that policies to reduce budget deficit would be beneficial for reducing current account deficit in Sri Lanka. Marinheiro (2008) empirically investigated twin deficit hypothesis, Ricardian equivalence hypothesis and Feldstein Horioka Puzzle in Egypt. He used annual data from 1974 to 2003 and performed cointegration, Granger causality test and fully modified OLS (FM-OLS) estimation techniques. Results rejected twin deficit hypothesis and found reverse

causal link moving from external deficit to internal deficit. Ricardian equivalence and Feldstein Horioka Puzzle are also rejected indicating the high international capital mobility and also specifying the need for future research.

Acaravci and Ozturk (2008) investigated the impact of internal deficit on external imbalances. They used quarterly data from 1987 to 2005 by utilizing the ARDL bound test for cointegration. The results supported the Keynesian view by founding positive relationship between internal and external imbalances. The unidirectional causality was found running from budget deficit to current account deficit. Javid et al. (2010) analyzed whether current account balance is effected by shocks of fiscal deficit in Pakistan. The study used annual data from 1960 to 2003 and employed structural Vector Autoregressive model VAR analysis. The results found that external deficit is improved by shocks of fiscal deficits while exchange rate is deteriorated. The Ricardian view is also supported as the output shocks explained twin divergence. Iram et al. (2011) investigated the presence of Keynesian view of twin deficits in Pakistan. Annual data has been used from 1972 to 2008 by employing ARDL framework, multivariate causality tests and seemingly unrelated regressions (SUR) techniques. Results supported the Keynesian view. Further, it is suggested that reduction in fiscal deficit is essential to eliminate current account deficit for enhancing economic growth.

Magazzino (2012) empirically investigated the twin deficits hypothesis and Ricardian equivalence hypothesis for European countries. He used annual data from 1970 to 2010 and employed Generalized Least Squares-Fixed Effects for static estimation and Generalized Method of Moments for dynamic estimation along with Granger causality test. Mixed results have been obtained. The FE estimator confirms the TD hypothesis. Yet, the dynamic estimates reached conflicting results. In fact, GMM-Dif estimates supported twin deficit hypothesis while the GMM-Sys method supported RE hypothesis. Granger causality test also showed mixed results. Ratha (2012) investigated the twin deficits hypothesis for India. The study used Monthly data from 1998:1 to 2009:9 and quarterly data from 1998Q1 to 2009Q1 and adopted bound testing approach for cointegration and ECM for estimation. Results found evidence for Keynesian proposition of twin deficits in short run while supported REH in long run. Thus, trade deficit can be reduced by decreasing budget deficit. While, fiscal policies are not effective in the long run. Asrafuzzaman et al. (2013) empirically examined the twin deficit hypothesis for Bangladesh. They used annual data from 1972 to 2012 and utilized cointegration test and VAR and Granger

causality tests for estimation. Results found absence of long run cointegration. While, in the short run causal link existed moving from budget deficit to current account deficit. However, government should take appropriate reforms to lessen budget deficit.

Kayhan et al. (2013) examined the association for public spending and trade deficit in Turkey. They used data from 1987Q1 to 2011Q3 and employed causality test for estimation. Findings showed presence of causality between public spending and trade deficit. An important conclusion can be drawn from results that decrease in trade deficit can be achieved by decreasing government spending. To permanently get rid of trade deficit, additional policy applications are needed. Catık et al. (2015) empirically evaluated the association between fiscal deficit and current account deficit for Turkey. They used data from 1994:1 to 2012:3 and employed causality test and VAR (TVAR) model for estimation. The results found the macroeconomic activity to be responsible for any connection between current account deficit and fiscal deficit. Therefore, external balance of an economy can be improved by appropriately using fiscal and monetary policies. Ravinthirakumaran et al. (2016) investigated whether there exist any causality between current account balance and fiscal deficit in SAARC countries. They used annual data from 1980 to 2012 and conducted cointegration technique, ECM and Granger causality test. Findings suggested existence of causal link between budget deficits and current account balance in SAARC economies. It is concluded SAARC countries must take appropriate policy measures in external and internal sector to get rid of both deficits.

2.2. Literature on Twin Deficits and Feldstein Horioka Puzzle

Fidrmuc (2003) examined the existence of twin deficits and Feldstein Horioka Puzzle in OECD countries and economies of Central and Eastern Europe. He used quarterly data from 1970 to 2001 and utilized Cointegration tests for estimation. The evidence of twin deficits was found in many countries. Feldstein Horioka puzzle is rejected due to existence of high financial integration. Aristovnik (2005) examined the presence of twin deficits and Feldstein-Horioka Puzzle for transition economies. He used panel data from 1990 to 2003 and utilized Pooled OLS, REM, FEM and OLS-PCSE for estimation. The empirical results found evidence in favor of twin deficits along with the Feldstein Horioka puzzle in transition economies. However, in transition countries the main emphasis should be on lessening of fiscal deficits to diminish the current account deficit. Baharumshah et al. (2009) observed association between twin deficits and

Feldstein Horioka puzzle in five ASEAN countries. They used annual data from 1960 to 2003 and employed cointegration tests for estimation. Results found evidence of twin deficits only in three ASEAN countries implying that government expenditures evict the private investment further indicating a noteworthy impact of investment on current account deficits. The Feldstein Horioka puzzle is rejected in these countries.

Aristovnik and Djuric (2010) explored the existence of twin deficits and Feldstein Horioka puzzle in countries of European Union. They used annual data from 1995 to 2008 period and employed OLS-PSCE, FGLS, random effect and fixed effects techniques. The results rejected the twin deficit hypothesis. Finally, a high financial integration leads to the rejection of Feldstein Horioka puzzle. However, it is concluded that fiscal deficit does not necessarily affect current account deficit. Lam (2012) examined whether twin deficit and Feldstein Horioka puzzle exists in Vietnam. He used data from 1990 to 2011 and adopted cointegration method, VECM, Granger causality tests for estimation. Results found evidence of twin deficit hypothesis to be true in long run and short run. Evidence of Feldstein Horioka demonstrates the imperfect integration of Vietnam in international markets. Saeed and Khan (2012) examined the association between Feldstein Horioka puzzle and twin deficits for Pakistan. They used data from 1972 to 2008 and employed cointegration technique and ECM for estimation. Results of cointegration found that high level of financial and capital market integration shows the absence of Feldstein Horioka puzzle in Pakistan. Bagheri et al. (2012) inspected the presence of twin deficit hypothesis and Feldstein Horioka puzzle in Iran. They used annual data from 1971 to 2007 time period and for estimation Seemingly Unrelated Regressions (SUR) procedure and causality tests have been employed. The results supported the twin deficits hypothesis in long run and causal relationship moving towards the current account deficit from fiscal deficit. Feldstein Horioka puzzle also found to be existed in Iran.

Twin deficits has gained much importance in past few years in both developing and developed countries. Policy makers have also remained interested in analyzing the possible link between fiscal deficit and current account deficit. An inclusive literature has discussed the twin deficits hypothesis in both developed and developing economies. In sum, the literature provides mixed results for the existence of twin deficits in different countries. But, there is limited work in South Asia which has examined the relevance of twin deficits jointly with Ricardian equivalence hypothesis and Feldstein Horioka Puzzle. Moreover, the literature does not incorporate the

private savings investment balance while estimating the twin deficits model. So it is essential to incorporate this variable in the model to discover that either budget deficit or private savings investment balance cause current account deficit. Further, it is also important to determine either the twin deficits or Ricardian equivalence hypothesis exists in South Asian countries and to what extent these countries are integrated in world market.

3. Model, Methodology and Data

3.1 Model

The macroeconomic theory of national income accounting identity can better describe the twin deficits phenomenon. Following Lam (2012), this study uses the national income accounting identity which provides the basic foundation for examining the relationship among current account deficit, budget deficit and private savings investment balance. In an open economy the model of the national income accounting identity is explained as follows:

$$\boldsymbol{Y = C + I + G + NX + NFI} \qquad \textbf{(1)}$$

Where, Y is gross national product, C is private consumption, I is investment, G is government spending, NX is net exports, and NFI net factors incomes from abroad.

The sum of the last two terms in equation (1) can be described as the current account balance:

$$\boldsymbol{CA = NX + NFI} \qquad \textbf{(1a)}$$

By replacing the last two terms with current account balance and after incorporating the domestic savings, equation (1) is written as follows:

$$\boldsymbol{CA = Y - C - G - I = S - I} \qquad \textbf{(2)}$$

As the domestic savings are sum of public savings (S^G) and private savings (S^P) so equation (2) becomes:

$$\boldsymbol{CA = S^P + S^G - I} \qquad \textbf{(3)}$$

Public savings are difference of tax revenues (T) and government spending (G) or equals to budget deficit (BD). So, by replacing S^G with (T - G), equation (3) can be written as:

$$\boldsymbol{CA = S^P + S^G - I = S^P + (T - G) - I} \qquad \textbf{(4)}$$

$$\boldsymbol{CA = S^P + (BD) - I} \qquad \textbf{(4a)}$$

$$CA = BD + (S^P - I) \quad \textbf{(4b)}$$

To understand the degree of association between budget deficit and current account deficit the above equation provides a basic context. It is argued that the stable gap between the private savings and domestic investments causes budget deficit and current account deficit to move in same direction.

3.2. Methodology

3.2.1. Econometric Model

The study has three econometric models. The first model is constructed to estimate the twin deficits hypothesis. For this purpose current account deficit is regressed on budget deficit and private savings investment balance. The second model is developed to estimate the Ricardian equivalence hypothesis in which dependent variable is private consumption expenditure and explanatory variables are budget deficit, government consumption expenditure, government gross debt, income growth and population growth. The third model is constructed to estimate the Feldstein Horioka puzzle in which dependent variable is current account deficit while explanatory variables are budget deficit and investment. The study used autoregressive distributed lag (ARDL) estimation techniques for cointegration as methodology.

3.2.1.1. Model for Twin Deficits

The study aimed to investigate the twin deficits hypothesis. So, following Chowdhury and Saleh (2007) and Basu and Datta (2005) the study estimated the econometric model for twin deficits in the presence of saving and investment gap. The model is as follows:

$$CA_i = \alpha_0 + \alpha_1 BD_i + \alpha_2 SI_{it} + \mu_i \quad \textbf{(5)}$$

Where, CA_i is current account deficit, BD_i is budget deficit, SI_i is private savings and investment balance (S^p – I), and μ_i is an error term.

3.2.1.2. Model for Ricardian Equivalence Hypothesis

Following Magazzino (2012) and Bagheri et al. (2012), the consumption function specification of Bernheim (1987) is used for testing the relevance of Ricardian equivalence hypothesis. So, the econometric model is as follows:

$$PCE_i = \beta_0 + \beta_1 BD_i + \beta_2 GCE_i + \beta_3 GD_i + \beta_4 YG_i + \beta_5 PG_i + \mu_i \quad \textbf{(6)}$$

Where, PCE_i is private consumption expenditures, BD_i is budget deficit, GEC_i is general government final consumption expenditures, GD_i is general government gross debt, YG_i is GDP growth, PG_i is population growth, and μ_i is an error term.

3.2.1.3. Model for Feldstein Horioka Puzzle

For testing the relationship among the current account deficit, budget deficit and total investment, this study uses the regression model of Fidrmuc (2003) which is as follows:

$$\boldsymbol{CA_i = \gamma_0 + \gamma_1 BD_i - \gamma_2 INV_i + u_i} \qquad \textbf{(7)}$$

Where, CA_i is current account deficit, BD_i is budget deficit, INV_i is investment, and u_i is an error term.

According to the national income accounting identity, a rise in investment ceteris paribus, deteriorates the current account deficit. So investment coefficient is likely to be negative ($\gamma_2 > 0$). If Ricardian equivalence does not prove to be true then the coefficient of budget deficit must be positive ($\gamma_1 > 0$), reflecting the existence of twin deficits and vice versa. So increase in investment and budget deficit leads to the current account deficit. If economies do not perfectly integrate in the world market then Feldstein–Horioka puzzle would be true in those countries and then the coefficient of investment must be less than one. But if countries are perfectly integrated with other economies of the world then Feldstein–Horioka puzzle does not exist and the coefficients of both budget deficit and investment must be equal to unity.

3.2.2. Test of Stationarity

In time series analysis the first and probably the most essential step is to evaluate that either data series are stationary or not to avoid spurious regression and misleading results. The time series data is very sensitive to unit root test and if data series appear to have unit root (non-stationary) then it may lead to ambiguous results. To avoid the problem of unit root this study uses ADF (Augmented Dickey Fuller) and PP (Phillips-Perron) unit root tests. Dickey and Fuller (1979) presented the Dickey Fuller unit root test by assuming that the error term are uncorrelated. But in order to address the situation when error terms are correlated (Serial Correlation), Dickey and Fuller presented an augmented Dickey Fuller unit root test in which they improved their previous unit root test by adding the lags of regressand on right hand side of the equation. In the study all data series are tested under ADF unit root test of stationarity and results of ADF unit root test

have been verified by PP unit root test. Phillips and Perron (1988) dealt with the serial correlation problem by proposing nonparametric statistical methods without adding the lag of the dependent variable.

3.2.3. Autoregressive Distributive Lag (ARDL) Model

There are various techniques that were used earlier to check cointegration between the variables (Engle-Granger, 1987; Johansen & Juselius, 1990; Johansen, 1995) but all these techniques required that the variable must be integrated of same order. However, if the data sample is not large then these traditional cointegration techniques are not reliable. Pesaran, Shin and Smith (2001) proposed another technique for cointegration called "Autoregressive Distributive Lag" (ARDL). This technique is applicable when the variables are mixture of I(0) and I(1). There are two assumptions of ARDL bound testing approach to cointegration i.e. regressand should be of order I(1) and no variable should be of order I(2). Violation of the assumptions of ARDL will give invalid F-statistics. The ARDL bound testing framework has numerous benefits in comparison to other cointegration techniques. Firstly, pre testing of the variables are not required by this technique i.e. independent variables are combination of I(0) or I(1). Secondly, information about structural breaks in series is provided by this technique. Thirdly, for integrating short run adjustments with long run, simple linear transformation of ARDL model is used to derive Error Correction Model (ECM). Finally, it gives more consistent results than the other traditional integration techniques because when the variables are mutually integrated then the standard cointegration techniques lead to unreliable results.

Specification of ARDL model:

$$\Delta Y_t = \lambda_0 + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + \sum_{i=1}^{p} \beta_i \Delta X_{t-i} + \sum_{i=1}^{p} \varphi_1 Y_{t-1} + \sum_{i=1}^{p} \varphi_2 X_{t-1} + \varepsilon_t \quad (8)$$

This is the dynamic linear equilibrium model. Where, on the right hand side the terms with Δ shows the first difference of the lagged variables. α, β, and γ represent the short run dynamics and φ_1, φ_2, and φ_3 are long run coefficient which shows marginal change in dependent variable due to change in independent variables. For testing the cointegration the following null hypothesis is tested:

H_0: $\varphi_1 = \varphi_2 = \varphi_3 = 0$ (There is no cointegration)

H_1: $\varphi_1 \neq \varphi_2 \neq \varphi_3 \neq 0$

In ARDL bound test the value of F-statistics is compared with upper and lower bounds. If the value is greater than upper bound then it confirms the existence of cointegration among the variables by rejecting the null hypothesis and if the value of F-statistics fall below the lower bound then there is no cointegration but if the value falls between the upper and lower bound then the results are inconclusive.

3.2.4. Error Correction Model

For the estimation of the short run dynamics, the transformation of ARDL model into Error Correction Representation is required. Error correction term (ECT) is the rate of adjustment which indicates that how quickly variables adjust towards equilibrium and its negative sign represents the convergence in the short run. This term should be negative and statistically significant to establish the long run relationship among variables.

The specification of the error correction model:

$$\Delta Y_t = \lambda_0 + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + \sum_{i=1}^{p} \beta_i \Delta X_{t-i} + \psi ECT_{t-1} + \varepsilon_t \qquad (9)$$

3.2.5. Diagnostics Tests

The strength of the model is tested by conducting diagnostics tests. Breusch-Ggodfrey (1978) test is used to check the residuals for serial correlation, Breusch-Pagan test for heteroscedasticity (1979), and Ramsey RESET Test (1969) for functional misspecification. Moreover, CUMSUM and CUSUMSQ tests have been utilized to evaluate the stability of the parameters. When two error terms are correlated then this situation is called serial correlation. In the presence of serial correlation variance of residuals will be underestimated, R^2 will report high value but t-statistics and F-statistics will be invalid which means that in the presence of serial correlation t-statistics and F-statistics will cause misleading conclusion. Serial correlation of the Residuals is tested under the null hypothesis (i.e. no serial correlation).

The term Heteroscedasticity refers to the situation when variance of the error term is not constant over the time period. In the presence of heteroscedasticity the parameters will not have minimum variance although they are unbiased and consistent. Breusch-Pagan-Godfrey test is used under the null hypothesis of no heteroscedasticity. If model is not correctly specified then there is model specification error and then the variance of error term will be incorrectly estimated.

Moreover, hypothesis testing will provide misleading results and forecasted values will be incorrect in the presence of model specification error.

CUMSUM and CUSUMSQ tests have been utilized to evaluate the stability of the parameters. Pesaran and shin (2001) also followed this test to observe the stability of the parameters. According to Pesaran and shin (2001), the coefficient of ECM should be empirically investigated under these stability tests. The parameters of ECM can be checked for stability under the null hypothesis (the regression equation is correctly specified). The null hypothesis can be accept if the stability test remains within the critical bounds at the 5 percent significance level.

3.2.6. Causality Analysis

The bound test through ARDL helps us to confirm about the presence or absence of long run relation among the variables but does not determine that which variable cause the other. Granger (1988) argued that if variables are integrated of order one and there is an evidence of strong cointegration between them then there will be a causal relationship in at least one direction. However, for short run analysis of variables the Granger causality test has been applied using a VAR model on the following set of equations:

$$\Delta CAB_t = \alpha_0 + \sum \alpha_{1i} \Delta CAB_{t-i} + \sum \alpha_{2i} \Delta BD_{t-i} + \sum \alpha_{3i} \Delta SI_{t-i} + \varepsilon_t \quad (9)$$

$$\Delta BD_t = \alpha_0 + \sum \alpha_{1i} \Delta BD_{t-i} + \sum \alpha_{2i} \Delta CAB_{t-i} + \sum \alpha_{3i} \Delta SI_{t-i} + \varepsilon_t \quad (10)$$

$$\Delta SI_t = \alpha_0 + \sum \alpha_{1i} \Delta SI_{t-i} + \sum \alpha_{2i} \Delta CAB_{t-i} + \sum \alpha_{3i} \Delta BD_{t-i} + \varepsilon_t \quad (11)$$

3.3. Data

The study used the time series data at an annual frequency for South Asian countries i.e. Bangladesh, India, Pakistan, and Sri Lanka from 1981 to 2014. Due to limitation of data for all South Asian countries the study focused on only four countries. The main sources of data are Handbook of Statistics (2010) and Pakistan Economic Survey (various issues), "International Financial Statistics Yearbook" published by International Monetary Fund, "World Development Indicators" published by the World Bank and "Key Indicators of Asia and Pacific" published by Asian Development Bank, Reserve Bank of India and Central Bank of Sri Lanka. The detailed description of the variables and their sources are given in Appendix A.

4. Results

4.1.1. Results for Bangladesh

4.1.1.1. Results of Unit Root Test and Cointegration Test

To avoid spurious regression it is essential to evaluate time series properties of the data. In the present study Augmented Dickey Fuller (1979) and Phillips-Perron (1988) unit root tests have been conducted to check the time series properties. Results of the ADF test have been verified by Phillips-Perron unit root test. The unit root results show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and private savings investment balance) are stationary at level I(0) and first difference I(1). Results show that the order of integration of the variables is not same which leads us to employ autoregressive distributed lag model (ARDL) to estimate the long run relationship among the variables. Unit root results also show that the study is not violating the assumption of ARDL bound testing approach. Table 4.1 reports the results of unit root tests for Bangladesh.

Table 4.1: Results of ADF and PP Unit Root Tests for Bangladesh

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
CA	-1.1171	-7.1585***	-2.9920	-5.8711***	I(1)	I(1)
BD	-1.5090	-5.6736***	-1.5090	-5.6736***	I(1)	I(1)
SI	3.2270*	-	-3.2134*	-	I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

Once the time series properties of the data are evaluated then ARDL bound test is conducted to test whether there exists any long run relationship among the variables. Results of the unrestricted ECM model are reported in table 4.2. After constructing an unrestricted ECM, bound test is applied on ARDL model and the value of F-statistics is compared with the upper and lower bounds values (5 percent significance level) as suggested by Pesaran et al. (2001). The value of F-statistics in table 4.3 falls below the lower bounds at 5 percent significance level, which means there is no evidence of cointegration. Hence, the twin deficit hypothesis can be rejected for the economy of Bangladesh. Results of the bound test are reported in table 4.3.

Table 4.2: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (3, 0, 1)	
Variable	**Coefficient**
CAB(-1)	0.8257*** (0.1688)
CAB(-2)	-0.4955** (0.2161)
CAB(-3)	0.5338** (0.1923)
BD	0.1470 (0.1159)
SI	0.1626 (0.1315)
SI(-1)	-0.1736 (0.1017)
C	0.3511 (1.4279)
R-squared	0.7796
F-statistic	14.1460

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% level respectively.*

Table 4.3: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	1.1335	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Table 4.4: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.1862	Prob. F(2,22)	0.3242
Obs*R-squared	3.0176	Prob. Chi-Square(2)	0.2212
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.7554	Prob. F(6,24)	0.6115
Obs*R-squared	4.9246	Prob. Chi-Square(6)	0.5535
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.4645	23	0.6467
F-statistic	0.2158	(1, 23)	0.6467

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

The diagnostic tests are applied to verify that the ARDL model is free from serial correlation (LM serial correlation test), heteroscedasticity (White test for heteroscedasticity) and model

specification error (Ramsey RESET Test) to avoid misleading results. Table 4.4 reports the results of the diagnostic tests.

4.1.1.2. Causality Analysis

Granger causality test using a VAR model has been performed to check the direction of causal relation among variables in the short run. The results show that there exists bidirectional causality between BD and CAB while no causal relationship exists between CAB and SI in the short run. Asrafuzzaman et al. (2013) also found bidirectional causality between BD and CAB in Bangladesh. Table 4.5 reports the results of the Granger causality test.

Table 4.5: Results of Granger Causality Test

Dep. Variable	**Short Run Causality (Chi-Square Test)**		
	Δ(CAB)	**Δ(BD)**	**SI**
Δ(CAB)	-	5.5978 (0.0609)	3.1312 (0.2090)
Δ(BD)	10.4168 (0.0055)	-	6.3017 (0.0428)
SI	1.6450 (0.4393)	0.1686 (0.9192)	-

Note: P values are in parenthesis. Δ is the difference operator.

4.1.2. Results for India

4.1.2.1. Results of Unit Root Test and Cointegration Test

The unit root results for India show that the dependent variable (current account deficit) is stationary at first difference I(1). While, all the explanatory variables (budget deficit and private savings investment balance) are mixture of I(1) and I(0). Table 4.6 reports the results of the unit root tests for India.

Table 4.6: Results of ADF and PP Unit Root Tests for India

Variables	**Augmented Dickey Fuller**		**Phillips- Perron**		**Order of Integration**	
	At Level	**At 1st Difference**	**At Level**	**At 1st Difference**	**ADF**	**PP**
CA	-2.3077	-6.2053***	-2.3077	-6.2878***	I(1)	I(1)
BD	-3.8156***	**-**	-4.1863***	**-**	I(0)	I(0)
SI	-1.0371	-6.0103***	-0.9789	-6.1507***	I(1)	I(1)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics in table 4.8 falls below the lower bounds at 5 percent significance level indicating that there is no evidence of cointegration. Therefore, twin deficit hypothesis is rejected for the Indian economy. Table 4.7 and table 4.8 reports the results of the unrestricted ECM model and bound test respectively.

Table 4.7: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (5, 4, 5)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.4872 (0.2954)	SI	0.3255** (0.1191)
CAB(-2)	0.1817 (0.3051)	SI(-1)	0.1787 (0.1900)
CAB(-3)	-0.0415 (0.3452)	SI(-2)	-0.4196* (0.2144)
CAB(-4)	0.7359* (0.4016)	SI(-3)	-0.0674 (0.2601)
CAB(-5)	0.0381 (0.4096)	SI(-4)	-0.3177 (0.1794)
BD	0.1279 (0.3108)	SI(-5)	0.2336 (0.1488)
BD(-1)	-0.4518 (0.3735)	C	-8.1152 (6.9076)
BD(-2)	-0.5023 (0.4049)	R-squared	0.8944
BD(-3)	-0.4905 (0.3837)	F-statistic	6.3492
BD(-4)	-0.3791 (0.3507)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.8: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	2.1143	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

The results of the diagnostic tests confirm that the selected ARDL model is free from serial correlation, heteroscedasticity and model specification error. Table 4.9 presents the results of diagnostic tests.

Table 4.9: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.1309	Prob. F(2,10)	0.3608
Obs*R-squared	5.3491	Prob. Chi-Square(2)	0.0689
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.6321	Prob. F(16,12)	0.1975
Obs*R-squared	19.8693	Prob. Chi-Square(16)	0.2262
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	1.6442	11	0.1284
F-statistic	2.7035	(1, 11)	0.1284

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

4.1.2.2. Causality Analysis

The results of Granger causality test show that there is no causal relationship between BD and CAB while unidirectional causality runs from SI to CAB in the short run. Table 4.10 reports the results of Granger causality test.

Table 4.10: Results of Granger Causality Test

Dep. Variable	**Short Run Causality (Chi-Square Test)**		
	Δ(CAB)	**BD**	**Δ(SI)**
Δ(CAB)	-	2.1810 (0.3361)	9.3549 (0.0093)
BD	1.9029 (0.3862)	-	0.94183 (0.6244)
Δ(SI)	2.6330 (0.2681)	4.3651 (0.1128)	-

Note: P values are in parenthesis. Δ is the difference operator.

4.1.3. Results for Pakistan

4.1.3.1. Results of Unit Root Test and Cointegration Test

The results of unit root test for Pakistan show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and private savings investment balance) are stationary at I(0) and first difference I(1). Table 4.11 reports the results of the unit root tests for Pakistan.

The value of F-statistics in table 4.13 falls below the lower bounds at 5 percent significance level which means there is no evidence of cointegration and hence twin deficits hypothesis is rejected for Pakistan. Results of unrestricted ECM model and bound test are given in table 4.12 and 4.13 respectively.

Table 4.11: Results of ADF and PP Unit Root Tests for Pakistan

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
CA	-2.3101	-5.1871***	-1.9262	-5.1854***	I(1)	I(1)
BD	-2.3761	-6.7140***	-2.3043	-6.7636***	I(1)	I(1)
SI	-2.9727**	-	-2.9727**	-	I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

Table 4.12: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (1, 1, 1)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.6634*** (0.1297)	SI(-1)	-0.2998** (0.1108)
BD	0.6211*** (0.1914)	C	-0.4155 (0.9912)
BD(-1)	-0.6872*** (0.1923)	R-squared	0.7632
SI	0.4785*** (0.0981)	F-statistic	17.4058

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.13: ARDL Bounds Test

Test Statistics	Value	k
F-statistic	2.9518	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Table 4.14: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.2802	Prob. F(2,25)	0.7580
Obs*R-squared	0.7234	Prob. Chi-Square(2)	0.6965
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.2514	Prob. F(5,27)	0.9354
Obs*R-squared	1.4678	Prob. Chi-Square(5)	0.9168
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	1.0034	26	0.3249
F-statistic	1.0068	(1, 26)	0.3249

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

The results of diagnostic tests confirm that the ARDL model is not suffering from serial correlation, heteroscedasticity and model specification error. Table 4.14 reports the results of the diagnostic tests.

4.1.3.2. Causality Analysis

The Granger causality test results show that there is not any causal relationship among BD, CAB and SI in short run. Table 4.15 reports the results of the Granger causality test.

Table 4.15: Results of Granger Causality Test

Dep. Variable	**Short Run Causality (Chi-Square Test)**		
	Δ(CAB)	**Δ(BD)**	**SI**
Δ(CAB)	-	2.522967 (0.2832)	3.885222 (0.1433)
Δ(BD)	0.115932 (0.9437)	-	0.125322 (0.9393)
SI	4.498298 (0.1055)	0.317771 (0.8531)	-

Note: P values are in parenthesis. Δ is the difference operator.

4.1.4. Results for Sri Lanka

4.1.4.1. Results of Unit Root Test and Cointegration Test

The unit root results for Sri Lanka show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and savings investment balance) are both stationary at level I(0). Table 4.16 reports the results of the unit root tests for Sri Lanka.

Table 4.16: Results of ADF and PP Unit Root Tests for Sri Lanka

Variables	**Augmented Dickey Fuller**		**Phillips- Perron**		**Order of Integration**	
	At Level	**At 1st Difference**	**At Level**	**At 1st Difference**	**ADF**	**PP**
CA	-0.9872	-6.6968***	-3.8154***	**-**	I(1)	I(1)
BD	-3.6668**	**-**	-3.5310**		I(0)	I(0)
SI	-3.9418**	**-**	-3.5390**	**-**	I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics in table 4.18 falls below the lower bounds at 5 percent significance level which means there is no evidence of cointegration. Hence, twin deficit hypothesis cannot be

accept for the economy of Sri Lanka. The results of the unrestricted ECM model and bound test are given in table 4.17 and table 4.18 respectively.

Table 4.17: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (1, 0, 1)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.4700*** (0.1485)	C	0.4474 (1.2173)
BD	0.4127** (0.1808)	R-squared	0.6716
SI	0.6044*** (0.1252)	F-statistic	14.315
SI(-1)	-0.6050*** (0.1490)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.18: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	3.4046	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

The diagnostic tests results confirm that the selected ARDL model is not suffering from serial correlation, heteroscedasticity and model specification error. Table 4.19 reports the results of the diagnostic tests.

Table 4.19: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.6695	Prob. F(2,26)	0.5206
Obs*R-squared	1.6163	Prob. Chi-Square(2)	0.4457
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.8050	Prob. F(4,28)	0.5324
Obs*R-squared	3.4035	Prob. Chi-Square(4)	0.4927
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	1.5945	27	0.1225
F-statistic	2.5424	(1, 27)	0.1225

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

4.1.4.2. Causality Analysis

The results of Granger causality test show that there is not any causal relationship between BD and CAB while unidirectional relationship exists running from CAB to SI in short run. Table 4.20 reports the results of the Granger causality test.

Table 4.20: Results of Granger Causality Test

Dep. Variable	**Short Run Causality (Chi-Square Test)**		
	Δ(CAB)	**BD**	**SI**
Δ(CAB)	-	1.574233 (0.4552)	0.181591 (0.9132)
BD	0.524350 (0.7694)	-	4.349621 (0.1136)
SI	5.294307 (0.0709)	0.650938 (0.7222)	-

Note: P values are in parenthesis. Δ is the difference operator.

4.1.5. Conclusion of Twin Deficits Hypothesis

The above results show the absence of cointegration among current account deficit, budget deficit and private savings investment balance so twin deficits hypothesis can be rejected for the South Asian countries. Asrafuzzaman et al. (2013) for Bangladesh, Basu and Datta (2005) for India, Ratha (2012) for India, Javid et al. (2010) for Pakistan also found no evidence for twin deficits hypothesis. But the previous literature does not incorporate the important variable; private savings investment balance while estimating the twin deficits model. So the study differentiates from the other studies by including this variable in the model and reveals the fact that both budget deficit and private savings investment balance do not effect current account deficit in South Asian countries. Findings of Granger causality test also show absence of causal relationship among current account deficit, budget deficit and private savings investment in the short run for all countries except for Bangladesh where bidirectional causality exists between BD and CAB in the short run. Similarly a unidirectional relationship exists running from SI to CAB in India, while in Sri Lanka unidirectional causality runs from CAB to SI in the short run. The developing countries including South Asia are marked for facing huge fluctuations, budgetary and current account imbalances. The results reveal the fact that in selected South Asian countries variations in the budget deficits and private saving investment balance do not cause any systematic changes in current account deficit. Therefore, the Keynesian view of twin deficits is rejected. The reasons for the absence of twin deficits in South Asian region can be attributed to

the fact that the difference of private savings and investment has not been stable during the period of the study separating both the deficits. Although the twin deficits hypothesis does not prove to be true in these countries but still each deficit cause several issues and their unlimited growth could cause severe harms to the economy.

4.2. Results of Ricardian Equivalence Hypothesis

4.2.1. Results for Bangladesh

4.2.1.1. Results of Unit Root and Cointegration Test

The unit root results of Bangladesh for Ricardian equivalence hypothesis show that the dependent variable (private consumption expenditure) is stationary at first difference I(1). While, the explanatory variables (budget deficit, government consumption expenditure, government gross debt, GDP growth and population growth) are stationary at level I(0) and first difference I(1). Table 4.21 reports the results of the unit root tests for Bangladesh.

Table 4.21: Results of ADF and PP Unit Root Tests for Bangladesh

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
PC	-0.0224	-6.3919***	0.0185	-6.8676***	I(1)	I(I)
BD	-1.5090	-5.6324***	-1.5090	-5.6736***	I(1)	I(1)
GCE	-3.0462	-4.2978***	-2.3959	-4.5748***	I(1)	I(1)
GD	-1.4637	-4.3205***	-2.0883	-4.2534***	I(1)	I(1)
YG	-8.0367***	-	-9.5621***	-	I(0)	I(0)
PG	-2.5646**	-	-2.7233***	-	I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics in table 4.23 falls below the lower bounds at 5 percent significance level which means that there is no evidence of cointegration. So Ricardian equivalence is rejected for Bangladesh. Results of the unrestricted ECM model and bound test are reported in 4.22 and table 4.23.

Table 4.22: Unrestricted ECM Model Estimation

Dependent Variable: PC Selected Model: ARDL(1, 0, 2, 0, 0, 2)			
Variable	**Coefficient**	**Variable**	**Coefficient**
PC(-1)	0.7051*** (0.1923)	PG	22.5844** (9.8369)
BD	-0.3081** (0.1368)	PG(-1)	-43.2901** (15.8227)
GCE	-1.9162* (1.0438)	PG(-2)	21.5457** (7.7499)
GCE(-1)	1.3733 (1.1900)	C	31.5248** (12.8261)
GCE(-2)	-2.9821** (1.0587)	R-squared	0.9837
GD	0.0776** (0.0373)	F-statistic	126.6990
YG	0.5164** (0.2319)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.18: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	1.8012	5
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

The results of diagnostic tests confirm that the selected ARDL model is not suffering from serial correlation, heteroscedasticity and model specification error. Table 4.24 reports the results of the diagnostic tests.

Table 4.19: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	3.5455	Prob. F(1,20)	0.0743
Obs*R-squared	4.8186	Prob. Chi-Square(1)	0.0282
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.4311	Prob. F(10,21)	0.9147
Obs*R-squared	5.4503	Prob. Chi-Square(10)	0.8591
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.1666	20	0.8693
F-statistic	0.0277	(1, 20)	0.8693

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

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4.2.2. Results for India

4.2.2.1. Results of Unit Root and Cointegration Test

The results of unit root for India show that the dependent variable (private consumption expenditure) is stationary at first difference I(1). While, the explanatory variables (budget deficit, government consumption expenditure, government gross debt, GDP growth and population growth) are stationary at level I(0) and first difference I(1). Table 4.25 reports the results of the unit root tests for India.

Table 4.25: Results of ADF and PP Unit Root Tests for India

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
PC	-1.5077	-4.9533***	-1.4641	-4.9434***	I(1)	I(1)
BD	-3.8156***	-	-4.1863***		I(0)	I(0)
GCE	-3.0237**	-	-2.6207*		I(0)	I(0)
GD	-1.5889	-4.3891***	-1.6234	-4.3709***	I(1)	I(1)
YG	-5.6067***	-	6.8119***	-	I(0)	I(0)
PG	-4.9159***	-	-7.0707***	-	I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics falls above the upper bounds at 1 percent significance level which means there is an evidence of strong cointegration. Results of the unrestricted ECM model and bound test are reported in table 4.26 and table 4.27 respectively.

The results of diagnostic tests confirm that the selected ARDL model is not suffering from serial correlation, heteroscedasticity and model specification error. Results of diagnostic tests are reported in table 4.28.

Table 4.26: Unrestricted ECM Model Estimation

Dependent Variable: PC Selected Model: ARDL (1, 0, 1, 0, 1, 2)			
Variable	**Coefficient**	**Variable**	**Coefficient**
PC(-1)	0.2751 (0.1762)	PG	83.8947* (42.9823)
BD	-0.2798 (0.2945)	PG(-1)	-4.9526 (79.7400)
GCE	-0.4495 (0.4994)	PG(-2)	-76.2610* (43.1776)
GCE(-1)	1.3502** (0.4892)	C	40.0440*** (8.7117)
GD	-0.0274* (0.0153)	R-squared	0.9669
YG	-0.3874*** (0.1191)	F-statistic	61.4540
YG(-1)	-0.2224** (0.1083)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.27: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	6.9662	5
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Table 4.28: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.0552	Prob. F(2,19)	0.3677
Obs*R-squared	3.1990	Prob. Chi-Square(2)	0.2020
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.8759	Prob. F(10,21)	0.5686
Obs*R-squared	9.4187	Prob. Chi-Square(10)	0.4929
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.7056	20	0.4886
F-statistic	0.4979	(1, 20)	0.4886

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

The long run coefficients are estimated by using ARDL approach of cointegration. Results of the long run coefficients are reported in table 4.29. The results show that Budget deficit negatively but insignificantly affect the private consumption expenditure. The government consumption

expenditure has positive and significant relation with private consumption expenditure. While, gross debt has negative and insignificant influence on private consumption expenditure. The parameter of GDP growth negatively and significantly affect private consumption expenditure while the population growth has positive and significant relation with private consumption expenditure. But the pure ricardian view implies that budget deficit must equal to zero (β_1=0). Therefore, it is necessary to test this hypothesis to check the relevance of Ricardian equivalence hypothesis. The hypothesis is tested through Wald test and the null hypothesis β_1=0 is not rejected. This evidence supports the Ricardian equivalence hypothesis that level of aggregate demand and interest rate does not change in the Indian economy as a consequence of financing budget deficits through taxes or borrowing. The results of the Wald test are reported in Table 4.30.

Table 4.29: Estimation of Long Run Dynamics

Cointeq = PC - (-0.3860*BD + 1.2424*GCE -0.0378*GD -0.8412*YG +3.6985*PG + 55.2379)	
Variable	**Coefficient**
BD	-0.3860 (0.4642)
GCE	1.2424** (0.4884)
GD	-0.0378 (0.0240)
YG	-0.8412*** (0.1829)
PG	3.6985*** (1.5195)
C	55.2379*** (6.3739)

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.30 Results of Wald Test

H_0: β_1=0		
Test Statistic	**Value**	**Probability**
Chi-square	0.9000	0.3428

ARDL model must be transformed into Error Correction Representation for the estimation of short run dynamics. Error correction term (ECT) reflects the rate of adjustment through which variables quickly adjust towards equilibrium and its negative sign represents the convergence in the short run. This term should be negative and statistically significant to establish the long run relationship among the variables. The results of short run dynamics in table 4.31 show that the

estimated coefficient of ECT is -0.806 which exhibits that the deviation from the long term equilibrium path is corrected by nearly 80.6 percent. Negative and statistically significant coefficient of the ECT further approves the long run relationship among all the variables.

After establishing the short run dynamics of the ARDL model, stability of the parameters are investigated by CUSUM and CUSUMSQ tests. If the model lies between the critical bounds then the model is stable and null hypothesis is not rejected. Figures 4.1 and 4.2 show the CUSUM and CUSUMSQ tests respectively and from these graphs it is found that model is stable.

Table 4.31 Estimation of Short Run Dynamics

Dependent Variable: ΔPC			
Variable	**Coefficient**	**Variable**	**Coefficient**
Δ (PC(-1))	-0.3931* (0.2073)	PG(-1)	73.1134 (93.8656)
BD	-0.0837 (0.3559)	PG(-2)	-149.1394** (60.1517)
GCE	-0.4868 (0.4964)	ECT(-1)	-0.8069*** (0.1826)
GCE(-1)	0.3366 (0.4769)	C	5.8202 (4.48403)
Δ (GD)	0.0139 (0.0526)	R-squared	0.72005
YG	-0.4952** (0.1978)	F-statistic	4.4427
YG(-1)	0.3564*** (0.1119)	Durbin-Watson stat	2.1753
PG	74.8337 (44.2461)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively. Δ is the difference operator.*

Figure 4.1: CUSUM Test

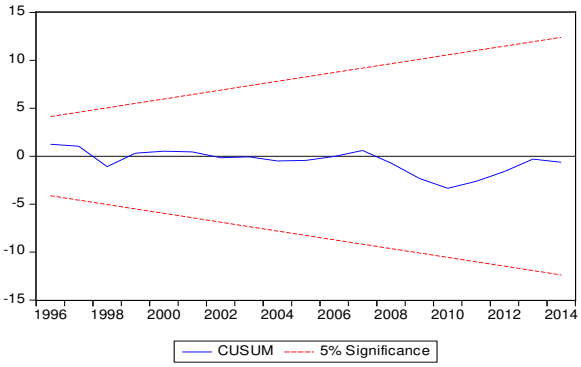
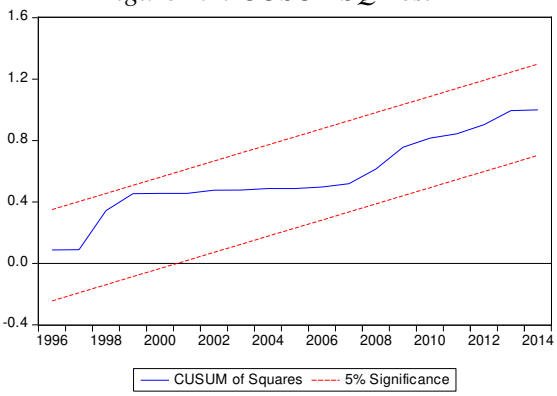


Figure 4.2: CUSUMSQ Test



4.2.3. Results for Pakistan

4.2.3.1. Results of Unit Root and Cointegration Test

The unit root results for Pakistan show that the dependent variable (private consumption expenditure) is stationary at first difference I(1). While, the explanatory variables (budget deficit, government consumption expenditure, gross debt, GDP growth and population growth) are stationary at level I(0) and first difference I(1). Table 4.32 reports the results of the unit root tests for Pakistan.

Table 4.32: Results of ADF and PP Unit Root Tests for Pakistan

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
PC	-1.9356	-6.3706***	-1.8686	-6.3510***	I(1)	I(1)
BD	-2.3760	-6.7139***	-2.3043	-6.7635***	I(1)	I(1)
GCE	-0.1365	-4.6324***	-0.1694	-4.6380***	I(1)	I(1)
GD	-2.0489	-4.1179***	-2.4508	-4.1179***	I(1)	I(1)
YG	-3.4862**	-	-3.4543**	-	I(0)	I(0)
PG	-0.4285	-4.3983***	-2.7874***	-	I(1)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics falls above the upper bounds at 1 percent significance level which means there is an evidence of strong cointegration. Results of the unrestricted ECM and bound test are reported in table 4.33 and table 4.34.

Table 4.33: Unrestricted ECM Model Estimation

Dependent Variable: PC Selected Model: ARDL (1, 0, 0, 1, 0, 0)			
Variable	**Coefficient**	**Variable**	**Coefficient**
PC(-1)	0.4303*** (0.1078)	YG	-0.0738 (0.1748)
BD	-0.1873 (0.2574)	PG	-0.9363 (0.9515)
GCE	-0.4486** (0.2276)	C	63.3489*** (11.1364)
GD	0.0835 (0.0955)	R-squared	0.8993
GD(-1)	-0.2867*** (0.0902)	F-statistic	31.8823

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.34: ARDL Bounds Test

Test Statistics	Value	k
F-statistic	5.7317	5
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

The results of diagnostic tests confirm that the selected ARDL model is not suffering from serial correlation, heteroscedasticity and model specification error. Table 4.35 reports the results of diagnostic tests.

Table 4.35: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.1036	Prob. F(2,23)	0.9020
Obs*R-squared	0.2946	Prob. Chi-Square(2)	0.8630
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.6878	Prob. F(7,25)	0.6813
Obs*R-squared	5.3291	Prob. Chi Square(7)	0.6199
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.8879	24	0.3834
F-statistic	0.7885	(1, 24)	0.3834

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

Table 4.36 reports the results of long run coefficients. Budget deficit has negative and insignificant effect on private consumption expenditure. The government consumption expenditure and gross debt both negatively and significantly affect private consumption expenditure While, the GDP growth and population growth also have negative and insignificant relation with private consumption expenditure. But pure ricardian view implies that budget deficit must equal to zero (β_1=0). The hypothesis is tested through Wald test and the null hypothesis β_1=0 is accepted. This evidence supports Ricardian equivalence hypothesis that aggregate demand and interest rate does not change in Pakistan as a results of financing budget deficits through taxes or borrowing. Results of the Wald test are reported in Table 4.37.

Table 4.36: Estimation of Long Run Dynamics

Cointeq = PC - (-0.3287*BD -0.7875*GCE -0.3567*GD -0.1296*YG -1.6436*PG + 111.1965)	
Variable	**Coefficient**
BD	-0.3287 (0.4375)
GCE	-0.7875** (0.3681)
GD	-0.3567*** (0.0633)
YG	-0.1295 (0.3054)
PG	-1.6436 (1.7312)
C	111.1965*** (4.9383)

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.37: Results of Wald Test

H_0: β_1=0		
Test Statistic	**Value**	**Probability**
Chi-square	0.5294	0.4669

The results of short run dynamics in table 4.38 reveal that the estimated coefficient of ECT is -0.482 which exhibits that the deviation from long term equilibrium path is corrected by nearly 48.2 percent. Negative and statistically significant coefficient of the ECT confirms the existence of long run relationship among the variables.

Table 4.38: Estimation of Short Run Dynamics

Dependent Variable: ΔPC			
Variable	**Coefficient**	**Variable**	**Coefficient**
Δ(PC(-1))	-0.1394 (0.1386)	PG	0.1906 (0.8819)
Δ BD)	-0.0283 (0.2020)	ECT(-1)	-0.4821*** (0.1702)
Δ(GCE)	-0.3856 (0.2753)	C	0.2000 (1.9457)
Δ(GD)	0.1174 (0.0814)	R-squared	0.6487
Δ(GD(-1))	-0.1149 (0.1040)	F-statistic	5.3087
YG	-0.1307 (0.1740)	Durbin-Watson stat	1.9880

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*
Δ is the difference operator.

Figure 4.3: CUSUM Test

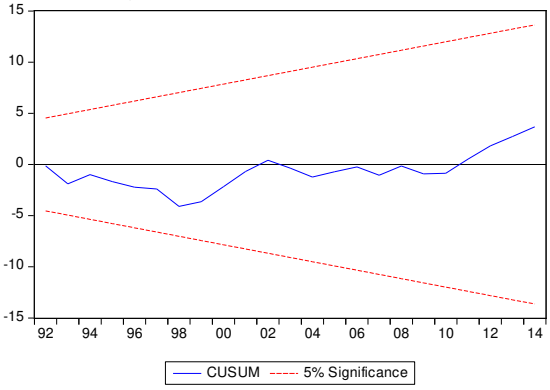
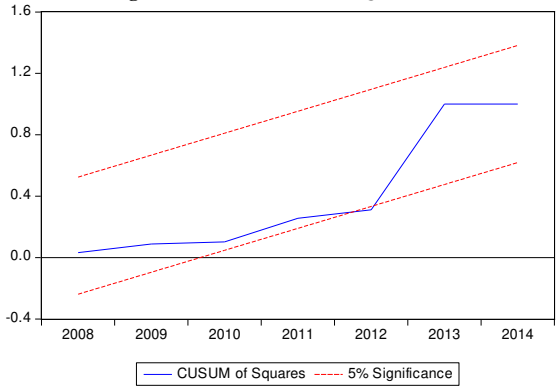


Figure 4.4: CUSUMSQ Test



Figures 4.3 and 4.4 show the CUSUM and CUSUMSQ tests respectively and from these graphs it is found that model is stable.

4.2.4. Results for Sri Lanka

4.2.4.1. Results of Unit Root and Cointegration Test

The unit root results for Sri Lanka show that the dependent variable (private consumption expenditure) is stationary at first difference I(1). While, the explanatory variables (budget deficit, government consumption expenditure, gross debt, GDP growth and population growth) are stationary at level I(0) and first difference I(1). Table 4.439 reports the results of the unit root tests for Sri Lanka.

Table 4.39: Results of ADF and PP Unit Root Tests for Sri Lanka

Variables	**Augmented Dickey Fuller**		**Phillips- Perron**		**Order of Integration**	
	At Level	**At 1st Difference**	**At Level**	**At 1st Difference**	**ADF**	**PP**
PC	-1.5297	-5.9250***	-2.150786**	-	I(1)	I(0)
BD	-3.6668**	-	-3.5310**	-	I(0)	I(0)
GCE	-1.7751	-5.9598***	-1.7471	-5.9513***	I(1)	I(1)
GD	-1.8475	-5.1822***	-1.9706	-5.1797***	I(1)	I(1)
YG	-4.3797***	-	-4.3797***	-	I(0)	I(0)
PG	-3.8899***	-	-3.9189***	-	I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics falls below the lower bounds at 5 percent significance level which means there is no evidence of cointegration. The results obtained point to the rejection of

Ricardian equivalence hypothesis for Sri Lanka. Results of the unrestricted ECM model and bound test are reported in table 4.40 and table 4.41.

Table 4.40: Unrestricted ECM Model Estimation

Dependent Variable: PC Selected Model: ARDL (1, 1, 0, 0, 0, 0)			
Variable	**Coefficient**	**Variable**	**Coefficient**
PC(-1)	0.5502*** (0.14964)	YG	0.4929** (0.2255)
BD	-0.4393** (0.1901)	PG	-0.3719 (0.7218)
BD(-1)	-0.1646 (0.1765)	C	23.7029* (12.1629)
GCE	-0.1493 (0.1188)	R-squared	0.8157
GD	0.0274 (0.0435)	F-statistic	15.8087

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.41: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	1.5366	5
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

The results of diagnostic tests confirm that the selected ARDL model is free from serial correlation, heteroscedasticity and model specification error. Table 4.42 reports the results of diagnostic tests.

Table 4.42: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.1382	Prob. F(2,23)	0.3378
Obs*R-squared	2.9719	Prob. Chi-Square(2)	0.2263
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.4639	Prob. F(7,25)	0.8512
Obs*R-squared	3.7936	Prob. Chi Square(7)	0.8032
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.2612	24	0.7962
F-statistic	0.0682	(1, 24)	0.7962

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

4.2.5. Conclusion of Ricardian Equivalence Hypothesis

The above results indicate that Ricardian equivalence hypothesis is rejected for Bangladesh and Sri Lanka revealing the fact that there might be a degree of association between budget deficit and current account deficit. And consumers of both these countries are not Ricardian i.e. as a result of tax reduction they do not increase their level of savings rather they increase their consumption expenditure. Therefore, the level of aggregate demand changes as a result of budget deficit. Siddiki (2010) for Bangladesh and Sivarajasingham and Balamurali (2011) for Sri Lanka also found no evidence of ricardian equivalence hypothesis. While, the results supported the Ricardian equivalence hypothesis in India and Pakistan. The reason for the acceptance of Ricardian equivalence hypothesis can be attributed to the fact that Indian and Pakistani consumers are Ricardian. Giorgioni and Holden (2003) also supported Ricardian equivalence hypothesis for developing economies including India and Pakistan. The rejection of Ricardian equivalence hypothesis indicates that fiscal policy is important to enhance private consumption and for stabilizing the economy by adjusting fiscal deficits. While, in Pakistan and India the theory of Ricardian is prove to be true indicating that fiscal policies are ineffective to stabilize these economies.

4.3. Results of Feldstein Horioka Puzzle

4.3.1. Results for Bangladesh

4.3.1.1. Results of Unit Root and Cointegration Test

The unit root results of Feldstein Horioka Puzzle for Bangladesh show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and investment) are stationary at level and first difference. Table 4.43 reports the results of the unit root tests for Bangladesh.

Table 4.43: Results of ADF and PP Unit Root Tests for Bangladesh

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
CA	-1.1171	-7.1585***	-2.9920	-5.8711***	I(1)	I(1)
BD	-1.5090	-5.6736***	-1.5090	-5.6736***	I(1)	I(1)
I	-4.2649**	-	-3.203490	-1.945690**	I(0)	I(I)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics falls above the upper bounds at 1 percent significance level which means that there is an evidence of strong cointegration. Results of the unrestricted ECM model and bound test are reported in table 4.44 and table 4.45.

Table 4.40: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (1, 0, 1)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.3420** (0.1276)	C	-3.8331*** (1.1124)
BD	0.3596*** (0.0748)	R-squared	0.8523
I	-1.4355*** (0.3316)	F-statistic	40.3866
I(-1)	1.6529*** (0.3394)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.45: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	8.8036	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

The results of diagnostic tests confirm that the selected ARDL model is not suffering from serial correlation, heteroscedasticity and model specification error. Table 4.46 reports the results of the diagnostic tests.

Table 4.46: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.0117	Prob. F(1,27)	0.9146
Obs*R-squared	0.0143	Prob. Chi-Square(1)	0.9048
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.4119	Prob. F(4,28)	0.7985
Obs*R-squared	1.8339	Prob. Chi Square(4)	0.7663
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.4733	27	0.6398
F-statistic	0.2239	(1, 27)	0.6398

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

Table 4.47 reports the results of long run coefficients. The parameter of both budget deficit and investment have positive and significant impact on current account deficit which means that both these coefficients lead to deterioration of current account deficit. But if budget deficit and investment are financed from the international capital markets and perfect integration exists in countries then coefficients of both these variables must be equal to unity. Therefore, it is necessary to test the hypothesis (H_0:γ_1=γ_2=1), to check the validity of Feldstein Horioka Puzzle. The hypothesis is tested through Wald test and the results show that null hypothesis (γ_1=γ_2=1) is rejected. This evidence leads to the non-rejection of Feldstein Horioka Puzzle in Bangladesh. The Wald test results are reported in table 4.48.

Table 4.47: Estimation of Long Run Dynamics

Cointeq = CAB - (0.5466*BD + 0.3305*I -5.8256)	
Variable	**Coefficient**
BD	0.5466*** (0.1316)
I	0.3305*** (0.0430)
C	-5.8256*** (1.0122)

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.48: Results of Wald Test

H_0: γ_1=γ_2=1		
Test Statistic	**Value**	**Probability**
Chi-square	298.5905	0.0000

Table 4.49: Estimation of Short Run Dynamics

Dependent Variable: ΔCAB			
Variable	**Coefficient**	**Variable**	**Coefficient**
Δ(CAB(-1))	0.0773 (0.1271)	C	0.2767 (0.6252)
D(BD)	0.2446** (0.1021)	R-squared	0.6699
I	-1.5963*** (0.2945)	F-statistic	10.5509
I(-1)	1.5848*** (0.2985)	Durbin-Watson stat	1.7846
ECT(-1)	-0.7248*** (0.1176)		

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*
Δ is the difference operator.

The results of short run dynamics in table 4.49 show that the estimated coefficient of ECT is -0.725 which exhibits that the deviation from long term equilibrium path is corrected by nearly 72.5 percent. Negative and statistically significant coefficient of the ECT confirms the existence of long run relationship among the variables.

Figure 4.5: CUSUM Test

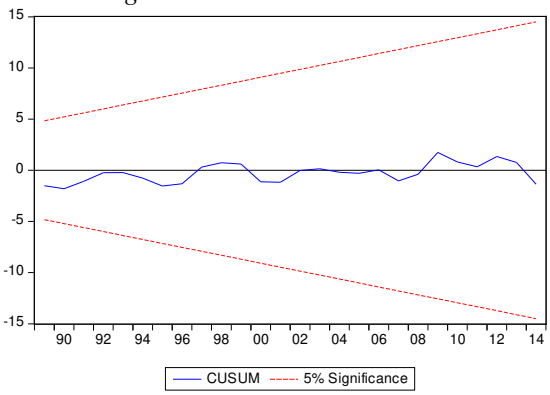
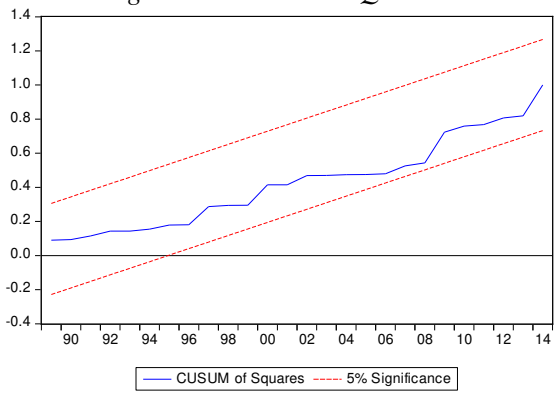


Figure 4.6: CUSUMSQ Test



Figures 4.5 and 4.6 show the CUSUM and CUSUMSQ tests respectively and from these graphs it is found that the model is stable.

4.3.2. Results for India

4.3.2.1. Results of Unit Root and Cointegration Test

The unit root results for India show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and investment) are stationary at level and first difference. Table 4.50 reports the results of the unit root tests for India.

Table 4.50: Results of ADF and PP Unit Root Tests for India

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
CA	-1.5843	-6.2053***	-1.5842	-6.2877***	I(1)	I(1)
BD	-3.8156***	-	-4.1863***	-	I(0)	I(0)
I	-2.3157	-6.1306***	-2.3157	-6.1306***	I(1)	I(1)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics falls below the lower bounds at 5 percent significance level which means there is no evidence of cointegration. The results reject the presence of Feldstein Horioka

Puzzle for India revealing the absence of cointegration among current account deficit, budget deficit and investment. Results of the unrestricted ECM model and bound test are reports in table 4.51 table 4.52.

Table 4.51: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (2, 1, 2)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.7284*** (0.1662)	I(-1)	0.1105 (0.0973)
CAB(-2)	0.3534*** (0.1867)	I(-2)	0.2389** (0.0886)
BD	0.2905** (0.1425)	C	0.5521 (1.0434)
BD(-1)	-0.3662** (0.1396)	R-squared	0.8082
I	-0.3681*** (0.0695)	F-statistic	14.4498

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.45: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	0.6749	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

The results of diagnostic tests confirm that the selected ARDL model is free from serial correlation, heteroscedasticity and model specification error. Results of diagnostic tests are reported in table 4.53.

Table 4.53: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.0846	Prob. F(2,22)	0.9192
Obs*R-squared	0.2443	Prob. Chi-Square(2)	0.8850
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.0856	Prob. F(7,24)	0.4029
Obs*R-squared	2.2707	Prob. Chi Square(7)	0.3602
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	1.5069	23	0.1455
F-statistic	0.2239	(1, 23)	0.1455

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

4.3.3. Results for Pakistan

4.3.3.1. Results of Unit Root and Cointegration Test

The unit root results for Pakistan show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and investment) are stationary at level and first difference. Table 4.54 reports the results of the unit root tests for Pakistan.

Table 4.54: Results of ADF and PP Unit Root Tests for Pakistan

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
CA	-2.3101	-5.1871***	-1.9262	-5.1854***	I(1)	I(1)
BD	-2.3761	-6.7140***	-2.3043	-6.7636***	I(1)	I(1)
I	-3.6286**	-	-2.2952	-5.7088***	I(0)	I(1)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics is falls below the lower bounds at 5 percent significance level which means there is no evidence of cointegration. The results lead to the rejection of Feldstein Horioka puzzle in Pakistan indicating the absence of cointegration among current account deficit, budget deficit and investment. Results of the unrestricted ECM model and bound test are reported in table 4.55 and table 4.56.

Table 4.55: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (1, 0, 0)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.5890*** (0.1307)	C	9.2361** (3.4022)
BD	0.1371 (0.1823)	R-squared	0.6029
I	-0.5184*** (0.1869)	F-statistic	14.6784

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

The diagnostic tests results confirm that the selected ARDL model is free from serial correlation, heteroscedasticity and model specification error. Table 4.57 reports the results of diagnostic tests.

Table 4.56: ARDL Bounds Test

Test Statistics	Value	k
F-statistic	3.2444	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Table 4.57: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.0274	Prob. F(2,27)	0.3715
Obs*R-squared	2.3339	Prob. Chi-Square(2)	0.3113
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.4092	Prob. F(3,29)	0.7476
Obs*R-squared	1.3401	Prob. Chi Square(3)	0.7196
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	0.1422	28	0.8879
F-statistic	0.0202	(1, 28)	0.8879

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

4.3.4. Results for Sri Lanka

4.3.4.1. Results of Unit Root and Cointegration Test

The unit root results of Sri Lanka show that the dependent variable (current account deficit) is stationary at first difference I(1). While, the explanatory variables (budget deficit and investment) are both stationary at level I(0). Table 4.58 presents the results of the unit root tests for Sri Lanka.

Table 4.58: Results of ADF and PP Unit Root Tests for Sri Lanka

Variables	Augmented Dickey Fuller		Phillips- Perron		Order of Integration	
	At Level	At 1st Difference	At Level	At 1st Difference	ADF	PP
CA	-0.9872	-6.6968***	-3.8154***	-	I(1)	I(1)
BD	-3.6668**	-	-3.5310**		I(0)	I(0)
I	-2.8895*	-	-2.8701*		I(0)	I(0)

*Note: ***, **, * represents 1%, 5%, and 10% significance level respectively.*

The value of F-statistics falls above the upper bounds at 5 percent significance level which means there is an evidence of strong cointegration. Results of the unrestricted ECM model and bound test are reported in table 4.59 and table 4.60.

Table 4.59: Unrestricted ECM Model Estimation

Dependent Variable: CAB Selected Model: ARDL (1, 0, 0)			
Variable	**Coefficient**	**Variable**	**Coefficient**
CAB(-1)	0.0270 (0.1293)	C	19.4116*** (4.3395)
BD	0.8126*** (0.1692)	R-squared	0.6428
I	-0.6662*** (0.1489)	F-statistic	17.3979

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.60: ARDL Bounds Test

Test Statistics	**Value**	**k**
F-statistic	5.6467	2
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

The diagnostic tests results confirm that the selected ARDL model is free from serial correlation, heteroscedasticity and model specification error. Table 4.61 presents the results of diagnostic tests.

Table 4.62: Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.2384	Prob. F(2,25)	0.7896
Obs*R-squared	0.5989	Prob. Chi-Square(2)	0.7412
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.9697	Prob. F(4,27)	0.1277
Obs*R-squared	7.2285	Prob. Chi-Square(4)	0.1243
Ramsay RESET Test			
	Value	**Df**	**Prob.**
t-statistic	1.1139	26	0.2755
F-statistic	1.2409	(1, 26)	0.2755

Note: ARDL model is not suffering from serial correlation, heteroscedasticity and specification error.

Table 4.62 reports the results of long run coefficients. The budget deficit has positive and significant impact on current account deficit while investment has negative relation with current account deficit as expected. So budget deficit deteriorates current account deficit and investment improves it. But if budget deficit and investment are financed from the international capital markets and perfect integration exists in countries then coefficients of both these variables must be equal to unity. Therefore, it is necessary to test the hypothesis (H_0:γ_1=γ_2=1), to check the

validity of Feldstein Horioka Puzzle. The hypothesis is tested through Wald test and the result shows that null hypothesis ($\gamma_1=\gamma_2=1$) is rejected. Thus, Feldstein Horioka Puzzle exists in Sri Lanka. Results of the Wald test are given in Table 4.63.

Table 4.63: Estimation of Long Run Dynamics

Cointeq = CAB - (0.8351*BD -0.6847*I + 19.9506)	
Variable	**Coefficient**
BD	0.8351*** (0.1371)
I	-0.6847*** (0.1520)
C	19.9506*** (4.3997)

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*

Table 4.64: Results of Wald Test

$H_0: \gamma_1=\gamma_2=1$		
Test Statistic	**Value**	**Probability**
Chi-square	152.2276	0.0000

The results of short run dynamics in table 4.64 show that the estimated coefficient of ECT is -0.931 which exhibits that the deviation from long term equilibrium path is corrected by nearly 93.1 percent. Negative and statistically significant coefficient of the ECT confirms the existence of long run relationship among the variables.

Table 4.65: Estimation of Short Run Dynamics

Dependent Variable: ΔCAB			
Variable	**Coefficient**	**Variable**	**Coefficient**
Δ(CAB(-1))	0.0599 (0.1949)	C	8.3001 (8.7108)
BD	0.0969 (0.2833)	R-squared	0.2921
I	-0.2746 (0.2758)	F-statistic	2.7849
ECT(-1)	-0.9312** (0.3449)	Durbin-Watson stat	1.5232

*Note: Standard errors are in parenthesis. ***, **, * shows significance at 1%, 5% and 10% respectively.*
Δ is the difference operator.

Figures 4.7 and 4.8 show the CUSUM and CUSUMSQ tests respectively and from these graphs it is found that the model is stable.

Figure 4.7: CUSUM Test

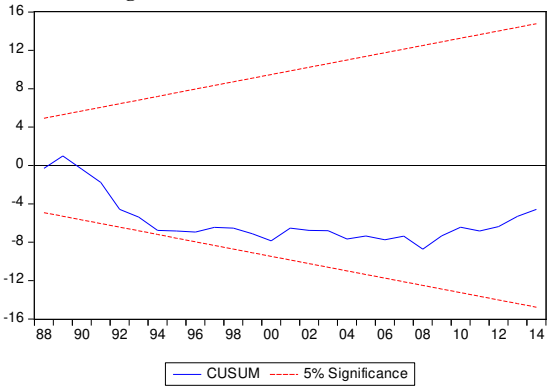
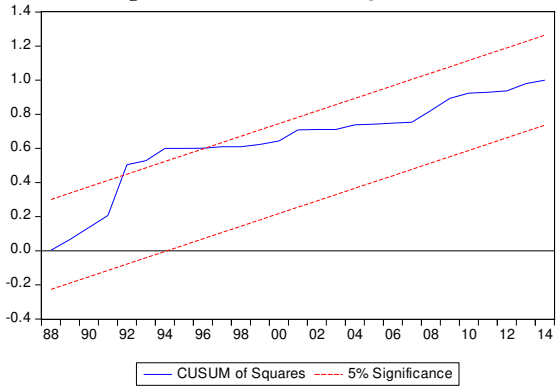


Figure 4.8: CUSUMSQ Test



4.3.5 Conclusion of Feldstein Horioka Puzzle

The Feldstein Horioka Puzzle is present in Bangladesh and Sri Lanka indicating low international capital mobility. The lack of capital mobility in these countries reveals that they do not need to rely on foreign savings to finance domestic investment implying that investment is regulated by the availability of domestic savings. Assessing the degree of financial integration provides implications for the national economies. A low level of financial integration indicates that the growth performance of a country will be inhibited by its capacity to save. In these circumstances, a budget deficit will crowd out investment, indicating that neither the Ricardian equivalence hypothesis nor the Keynesian view will be valid in the economy.

However, Feldstein Horioka puzzle is not present in India and Pakistan implying low level of correlation between savings and investment further indicating a high level of international capital mobility. This is probably due to the fact that both these economies are integrated in the world market as Pakistan has the advantage of exporting rice, fruits, textile, cutlery, wheat and surgical instruments and India is famous for its exports of gems, precious metals, organic chemicals, vehicles, machines, engines, pharmaceuticals and cotton. But the fact is that both these economies are weak and not fully integrated in the world market which means low correlation between savings and investment does not necessarily imply high level of international capital mobility as there could be other factors inducing perfect capital mobility such as economic conditions of a country, difference in internal and external sectors across countries, stable political environment, and modern means of power and technology. Being the developing countries; in India and especially in Pakistan there is deficiency of all these factors that is why they are not considered to be perfectly integrated in the world market. Wahid et al. (2008) in

South Asia and Saeed and Khan (2012) for Pakistan also found no evidence of Feldstein Horioka puzzle in different countries.

5. Conclusion

The study aimed to analyze twin deficits hypothesis in South Asian countries (Bangladesh, India, Pakistan and Sri Lanka). The study also intended to investigate the Ricardian equivalence hypothesis and Feldstein Horioka puzzle. The data is used from 1981 to 2014 at an annual frequency. To achieve all the objectives the study has conducted unit root tests (ADF and PP), ARDL bound testing approach for cointegration and Granger causality test for estimation. The study has focused on limited number of countries due to data limitations.

Theoretical model of the study is based on national income accounting identity which provides a basic framework to explore the relationship among current account deficit, budget deficit and private savings investment balance. The basic model is used to estimate the twin deficits hypothesis. While, the other models are used to examine the Ricardian equivalence hypothesis and Feldstein Horioka puzzle in South Asian Countries.

The results found no evidence of twin deficits hypothesis in South Asian countries rejecting the Keynesian view that budget deficit increases domestic absorption leading to increased imports and deterioration of current account deficit. But the previous literature does not incorporate the important variable; private savings investment balance while estimating the twin deficits model. So this study differentiates from the other studies and contributes to the existing literature by including this variable in the model and revealing the fact that both budget deficit and private savings investment balance do not have any impact on current account deficit in South Asian countries. The results of Granger causality test reveals that there does not exist any causal link between CAB and BD in any country except for Bangladesh where bidirectional causation exists between BD and CAB in the short run. Similarly a unidirectional relationship has been found running from SI to CAB in India, while in Sri Lanka unidirectional causality runs from CAB to SI in the short run.

For Ricardian equivalence hypothesis mixed results are obtained; the hypothesis is rejected for Bangladesh and Sri Lanka revealing the fact that consumers of these countries are not Ricardian and as a result of tax reduction they do not increase their level of savings rather they increase their consumption expenditure hence changing the level of aggregate demand. While, the results

supported the Ricardian equivalence hypothesis in India and Pakistan indicating that fiscal policies are ineffective to stabilize these economies.

The findings show that Feldstein Horioka puzzle exists in Bangladesh and Sri Lanka supporting the view both these economies are not fully integrated in the international market. However, Feldstein Horioka puzzle does not exist in India and Pakistan implying low level of correlation between savings and investment further indicating that both these countries are integrated in world market. But the fact is that both these economies are not fully integrated in the world market which means low correlation between savings and investment does not necessarily imply high level of international capital mobility. There could be other factors inducing perfect capital mobility such as economic conditions of a country, difference in internal and external sectors across countries, stable political environment, and modern means of power and technology.

Further, there are various other macroeconomic channels (variables) i.e. exchange rate, interest rate, money supply, output and inflation through which budget deficit can effect current account deficit. So, by incorporating those variables the model for twin deficits hypothesis can be re-estimated which specify the need for future research.

5.2. Policy Recommendations

In the light of above findings following Policy recommendations are suggested by the study:

- Government should take appropriate reforms in fiscal and trade sectors to avoid any possible emergence of twin deficits in the region.
- Fiscal policy is most important stabilizing mechanism available to government for sustainable economic growth. So, government should design the effective fiscal policies to augment economic growth.
- The government should encourage perfect capital market integration by improving their relations with other economies. It will help to attract Foreign Direct Investment and also increases the scope of investment opportunities abroad. An increase in capital inflows will also boost up employment opportunities and wage levels specially in developing economies.

References

Acaravci, A., & Ozturk, I. (2008). Twin Deficits Phenomenon: Empirical Evidence from the ARDL Bound Test Approach for Turkey. *Bulletin of Statistics & Economics, 2*(08), 58-64.

Akbostancı, E., & Tunc, G. I. (2002). Turkish Twin Deficits:An Error Correction Model of Trade Balance. *Economic Research Center Working Papers in Economics, 6*.

Anoruo, E., & Ramchander, S. (1998). Current Account and Fiscal Deficits:Evidence from Five Developing Economies of Asia. *Journal of Asian Economics, 9*(3), 487-501.

Aqeel, A., Nishat, M., & Qayyum, A. (2000). The Twin Deficits Phenomenon: Evidence from Pakistan. *The Pakistan Development Review, 39*(4), 535-550.

Aristovnik, A. (2005). Twin Deficits Hypothesis and Horioka-Feldstein Puzzle in Transition Economies. *EconPapers*, 1-20. Retrieved from http://econpapers.repec.org/RePEc:wpa:wuwpif:0510020

Aristovnik, A., & Djuric, S. (2010). Twin Deficits and the Feldstein-Horioka puzzle: A Comparison of the EU Member States and Candidate Countries. *EconoPapers*, 1-20. Retrieved from http://econpapers.repec.org/RePEc:pra:mprapa:24149

Asrafuzzaman, Roy, A., & Gupta, S. D. (2013). An Empirical Investigation of Budget and Trade Deficits:The Case of Bangladesh. *International Journal of Economics and Financial Issues, 3*(3), 570-579.

Bagheri, F., Keshtkaran, S., & Hazrati, F. D. (2012). Twin Deficits and Feldstein-Horioka Puzzle in the Case Iran. *Journal of Social and Development Sciences, 3*(5), 167-171.

Baharumshah, A. Z., Ismail, H., & Lau, E. (2009). Twin Deficicts Hypothesis and Capital Mobility:The ASEAN-5 Perspective. *Jurnal Pengurusan, 29*, 15-32.

Barro, R. J. (1974). Are Government Bonds Net Wealth? *Journal of Political Economy, 82*(6), 1095-1117.

Barro, R. J. (1989). The Ricardian Approach to Budget Deficits. *The Journal of Economic Perspectives, 3*(2), 37-54.

Basu, S., & Datta, D. (2005). Does Fiscal Deficit Influence Trade Deficit?: An Econometric Enquiry. *Economic and Political Weekly, 40*(30), 3311-3318.

Bernheim, D. B. (1987). Ricardian Equivalence: An Evaluation of Theory and Evidence. *NBER Macroeconomics Annual, 2*, 263-304.

Bluedorn, J., & Leigh, D. (2011). Revisiting the Twin Deficits Hypothesis:The Effect of Fiscal Consolidation on the Current Account. *IMF Economic Review, 59*(4), 582-602.

Catık, A. N., Gok, B., & Akseki, U. (2015). A Nonlinear Investigation of the Twin Deficits Hypothesis over the Business Cycle:Evidence from Turkey. *Economic Systems, 39*(1), 181–196.

Chowdhury, K., & Saleh, A. S. (2008). Testing the Keynesian Proposition of Twin Deficits in the Presence of Trade Liberalisation: Evidence from Sri Lanka. *The Middle East Business and Economic Review, 20*(1), 20-37.

Engle, R. F., & Granger, C. W. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica, 55*(2), 251-276.

Feldstein, M., & Horioka, C. (1980). Domestic Savings and International Capital Flows. *Economic Journal, 90*(358), 314-329.

Fidrmuc, J. (2003). The Feldstein–Horioka Puzzle and Twin Deficits in Selected Countries. *Economics of Planning, 36*(2), 135–152.

Fleming, J. M. (1962). Domestic Financial Policies Under Fixed and Floating Exchange Rates. *Staff Papers (International Monetary Fund), 9*(3), 369-380.

Giorgioni, G., & Holden, K. (2003). Does the Ricardian Equivalence Proposition Hold in Less Developed Countries? *International Review of Applied Economics, 17*(2).

Granger, C. W. (1988). Causality, cointegration, and control. *Journal of Economic Dynamics and Control, 12*(2-3), 551-559.

Iram, S., Ali, S., Sadaqat, M., & Rabbi, F. (2011). Old Wine in New Bottles: Testing the Keynesian Preposition of Twin Deficit in Case of Pakistan. *International Journal of Business and Social Science, 2*(5), 209-213.

Javid, A. Y., Javid, M., & Arif, U. (2010). Fiscal Policy and Current Account Dynamics in the Case of Pakistan. *The Pakistan Development Review, 49*(4), 577–592.

Johansen, S., & Katarina, J. (1990). Maximum Likelihood Estimation and Inference on Cointegration-With Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics, 52*(2), 169–210.

Kayhan, S., Bayat, T., & Yuzbasi, B. (2013). Government Expenditures and Trade Deficits in Turkey: Time Domain and Frequency Domain Analyses. *Economic Modelling, 35*, 153–158.

Keynes, J. M. (1936). *The General Theory of Interest, Employment and Money*.

Lam, N. X. (2012). Twin Deficits Hypothesis and Feldstein-Horioka Puzzle in Vietnam. *International Research Journal of Finance and Economics*(101), 169-179.

Lau, Baharumshah, E., & Zubaidi, A. (2006). Twin Deficits Hypothesis in SEACEN Countries:A Panel Data Analysis of Relationship between Public Budget and Current Account Deficits. *Applied Econometrics and International Development, 6*(2), 214-226.

Magazzino, C. (2012). Fiscal Policy, Consumption and Current Account in the European Countries. *Economics Bulletin, 32*(2), 1330-1344.

Marinheiro, C. F. (2008). Ricardian Equivalence, Twin Deficits, and the Feldstein–Horioka Puzzle in Egypt. *Journal of Policy Modeling, 30*(6), 1041–1056.

Mundell, R. A. (1968). *International Economics* . MacMillan.

Onafowora, O. A., & Owoye, O. (2006, Spring). An Empirical Investigation of Budget and Trade Deficits: The Case of Nigeria. *The Journal of Developing Areas, 39*(2), 153-174.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics, 16*(3), 289-326.

Ratha, A. (2012). Twin Deficits or Distant Cousins? Evidence from India. *South Asia Economic Journal, 13*(1), 51-68.

Ravinthirakumaran, N., Selvanathan, S., & Selvanathan, E. A. (2016). The Twin Deficits Hypothesis in the SAARC Countries:An Empirical Investigation. *Journal of the Asia Pacific Economy, 21*(1), 77-90.

Saeed, S., & Khan, M. A. (2012). THE Feldstein-Horioka Puzzle and Twin Deficits in Pakistan. *Academic Research International, 2*(2), 525-532.

Saleh, A. S. (2006). Long-Run Linkage Between Budget Deficit and Trade Deficit in Lebanon:Results from the UECM and Bounds Tests. *IIUM Journal of Economics and Management, 14*(1), 29-48.

Saleh, A. S., Nair, M., & Agalewatte, T. (2005). The Twin Deficits Problem in Sri Lanka:An Econometric Analysis. *South Asia Economic Journal, 6*(2), 221-239.

Samadi, A. H. (2006). The Twin Deficits Phenomenon in Some MENA Countries. *Iranian Economic Review, 10*(16), 129-140.

Siddiki, J. U. (2010). The Ricardian Equivalence Hypothesis:Evidence from Bangladesh. *Applied Economics, 42*(11), 1419-1435.

Sivarajasingham, S., & Balamurali, N. (2011). An Emoirical Analysis of the Twin Deficits Evidence from Sri Lanka. *Journal of Management, 7*(1), 74-92.

Vamvoukas, G. A. (1999). The Twin Deficits Phenomenon: Evidence from Greece. *Applied Economics, 31*(9), 1093-1100.

Wahid, A. N., Salahuddin, M., & Noman, A. M. (2008). Saving Investment Correlation in South Asia- A Panel Approach. *European Journal of Economics, Finance and Administrative Sciences*(11), 154-159.

Appendix A

Variables	Description	Sources
CA	Current account deficit as a % of GDP	IFS
BD	Budget deficit as a % of GDP	ADB
S	Gross savings as a % of GDP	WDI
PS	For Pakistan and India: Private savings as a % of GDP For Bangladesh and Sri Lanka: Gross Private Savings as a % of GDP measured by taking the difference of gross domestic savings and gross public savings as a % of GDP	Pakistan's Hand Book of Statistics (2010) Annual reports of State Bank of Pakistan (2013, 2014) Reserve Bank of India WDI ADB
I	Total investment as a % of GDP	IFS
SI	Private savings and investment balance as a % of GDP calculated by taking the difference between Private savings and total investment	IFS
PCE	Private consumption expenditure as a % of GDP	ADB
GCE	General Government final consumption expenditure as a % of GDP	WDI
GD	General Government gross debt as a % of GDP	IFS
YG	GDP growth (annual %), proxied for income growth	WDI
PG	Population growth (annual %)	WDI