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Budget Alliance, Macroeconomics Variables and Twin Deficit Phenomenon: A Comparative Study of Selected Developing Countries

Abstract

This study investigates the nexus between BD and CAD by employing the ADF & ARDL tests from 2000 to 2020. Moreover, it is also examine that weather the Keynesian Theory of Proposition or Ricardian Equivalence Hypothesis is more appropriate for selected developing economies. The result revealed that FD & CAD are positive & significant for LIC and UMC. However, negative coefficient found for LMC and all developing countries. REER significantly affects the CAB for LMC, UMC and all developing countries except LIC. Impact of GFCF on CAB is negative for all cases. The coefficient of GDPPCG and Trade are insignificant for LIC. However, significant relationship found for LMC, UMC and for all developing countries. This paper also pointed the theory of Keynesian proposition is more appropriate for LIC & UMC. Similarly, the theory of Ricardian Equivalence Hypothesis is more suitable for LMC and all developing countries.

1. Introduction

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The purpose of this study is to examine the nexus between FD and CAD in the field of high technological opportunity through the balance of payment (BOP). In developing countries technological profile affects the performance of BOP in national and international markets along with demand and supply side apparatus. On Supply side, according to endogenous growth model, economic growth can be increased with greater opportunities for inventions, the different structural activities of countries and for technological spillovers. On demand side, specialization can influence the growth by influencing the income elasticity's of imports and exports according to BOP constrained growth model. Economies which have low level of import and high level of export can increase their benefit in order to increase the international demand and high growth rate that are reliable along with equilibrium on the current account of BOP. Current account plays a vital role in order to maintain BOP. For every country, the maintenance of CAB is the big concern.

In present literature, the BD and CAD generally recognized important interesting research area relating to macroeconomic subject. It discussed about the sustainable BD as one of the most important pre-conditions for every economy to grow. While on the other hand, huge CAD

accepted to be one of the major macroeconomic ailments, which endanger the outside permanence in particular and the macroeconomic permanence in general.

The association among BD and CAD which is commonly recognized “Twin Deficit Hypothesis” becomes an attractive research region for economists in the previous few decades. Twin deficits hypotheses occur through the “Reagan Fiscal Experiment” in the 1980s. Historically, the positions of current account of developing countries have deficits. Ultimately neutral FD gives way to CAD and creates a huge stock of foreign debt. If this aspect related to the role between BD and CAD declare to be inaccurate, strategy try to decrease the govt. expenditure or widening the taxes or private saving or govt. investment etc. not reduce the CAD.

Low-income counties (LIC's) are those countries who's GNI (Gross National Income) remains \$1,045 or less, according to 2021 per capita GNI calculate using the Atlas method by World Bank. GNI per-capita converted to US dollar by dividing the mid-year population, via using the World Bank Atlas method. ⁶ GNI is the summation of value-added through all internal producers & production taxes, not incorporated in the valuation of output plus ¹⁷ income received from abroad. Lower middle-income countries (LMC's) GNI remains between \$1,046 – 4,095 & Upper middle-income countries (UMC's) remains 4,096 – 12,695. This paper evaluates the comparative studies of LIC's, LMC's, UMC's and all developing countries of the world, as there are different tendencies in FD and CAB.

⁴ Theoretical work on the connection between BD and CAD is based on the two theories i.e. Keynesian Proposition and Ricardian-Equivalence-Hypothesis. Keynesian theory explains the FD affects the CAD statistically by different channels like interest rate and exchange rate. Furthermore, the theory of Ricardian equivalence hypothesis elaborates the relationship between FD and CAD. It shows that BD and CAD both are neutral and does not cause each other. This paper also attempts to investigate that which theory (Keynesian proposition or Ricardian equivalence hypothesis) is exists in case of selected developing countries.

In the recent few decades, several developing countries have made the different fundamental strategies regarding to decrease the BD, to remove the CAD, decrease the inflation. In spite of these strategies, large BD and CAB remain positive because many developing nations failed to remove these deficits. The reality that these deficits continue in other developing countries calls for reexamination of the relationship between FD and CAD. In the initial many developing countries gain benefited from debts, but the fiscal and current account are carried on unabated. A number to empirically estimate regarding the twin deficit that internal deficit affects the external deficit. In another words, to understand the relationship between these two deficits is

significant in preparation and application of macro-economic strategies mandatory in order to eliminate the twin deficit, which have been deliberated as a pre-condition for the economic growth. Once this relationship between fiscal and trade deficits is affirmed than policy-makers might these deficits in control and maintain economic growth. Continuation in international debts leads to an increase in trade deficit.

The general objectives are to measure the communication among the BD and CAD in selected developing countries describes as under:

1. To determine the association among FD and CAD ²¹ in the long run.
2. To determine the relationship between BD and CAD in the short run.
3. To suggest the policy measures based on the findings of the study.

2. Review of Literature

[Hailemareiam \(2023\)](#) pointed out the positive connection between FD and CAD by applying the ARDL model from 1987-2021 & support the Keynesian theory for Ethiopian country. [Chinweuba \(2022\)](#) using the time series data from 1980 to 2022 with granger causality and VAR model. The finding showed that there is a positive connection between FD and CAD & also confirm the existence of THD. Furthermore, [Abu and Gamal \(2020\)](#) express the validity of TDH from 1981 to 2017 for Nigeria by used the ARDL model and also finds the one way causality that goes from CAD to FD. On the other extreme, [Samotu and Orisadare \(2020\)](#) observed no causality between the variables. [Hussain et al \(2023\)](#) evaluated the TDH for the context developing countries, adopted granger causality and ARDL econometrics techniques. They concluded by saying that casualty travelled from FD to CAB.

[Abbasi et al \(2021\)](#) finds the presence of TDH for Iran in long-run and short-run. While on the other side there is no evidence found for Turkey from 1992 to 2019. [Damalie and Daniel \(2019\)](#) examined the TDH for Uganda from 1980-2017 through VECM and granger causality tests and concluded the inverse relation between FD and CAD. Moreover, they also revealed that reversed causality running from CAD to FD. Both in the long-run and short-run, [Mukhtar et al \(2021\)](#) displayed the asymmetric effects of BB on CAB for the context of Pakistan economy. [Shifidi and Nyambe \(2020\)](#) proved the positive association BD & CAD and unidirectional causality that goes from CAD to BD in Namibia by used the cointegration and granger casualty. [Jayasooriya \(2020\)](#) observed the negative link REER& CAB while other controlled variables i.e. GDP growth, productivity, trade openness and broad money affect the CAB positively and significantly in South Asia by applied the panel ARDL during 1980-2015. Exerts

Mehta and Mallikarjun (2023) used the ARDL model over the period from 1978-2021 for India economy and pointed out that FD, exchange rate, trade openness and income affects the CAD positively and significantly. Similarly, Nautiyal et al. (2022) concluded the positive association between FD and CAD along with the validity of Keynesian approach in India from 2000 to 2019. Dey and Tareque (2022) examined the TDH case study of Bangladesh with ARDL and VAR model and concluded the uni-directional causality that goes from FD to CAD. Similarly, Rehman et al. (2020) pointed the uni-directional causality that running from BD to CAD for Pakistan. Additionally, Kalaj and Mema (2015) analyzed the TDH in Albania, ranging the data from 1991 to 2014. They applied Granger test and concluded that there is a unidirectional causality from BD to CAD. In short run there is no arithmetical consequence on the causal relation of CAD on the BD.

Kafle et al. (2022) support the REH in Nepal from 1988 to 2018 by used the ARDL model and no causality found between the variables in any direction. Additionally, for the same economy Kharel and Kharel (202) analyzed that BD affects the CAD significantly from 2003 to 2020. Tufail et al (2014) examined the TDH in the context of Pakistan covered the period from 1972 to 2011. Collected the data from world development indicator by applying the different econometrics tests i.e. Johansen Co-integration, Error correction model and granger causality. In the long-run Johansen co-integration pointed out the positive and significant association between FD and CAD. ECM showed the divergence of the economy in short run to long run. The ECM indicates that 30.88% convergences occur within year. Granger causality results expressed that there is bidirectional between the FD and CAD.

Ibrahim and Nurkamilova (2022) elaborated the THD for Kyrgyzstan by applying the ARDL model and showed the validity of Keynesian theory over the period from 1993 to 2021. Furthermore, according to granger casualty test discovered the one way casualty flows from BD to CAD. Similarly, Rehman and Saeed (2017) explored the association between TDH in the context of Pakistan. This study collected the data from Federal Bureau of Statistic, Annual Reports of the State Bank, Pakistan Economy and IMF. Based on the ARDL and Granger Causality analysis ranging the data from 1972 to 2015; it was concluded that one way causality traveled from CAD to the BD and confirmed the presence of THD.

Njoroge et al (2014) examined the TDH period from 1970-2012 for Kenya and concluded that there is indirect effect through transmission from BD to interest rate, from interest rate to exchange rate, and from exchange rate of CAD. However, there is no direct effect between them.

For Sub-Saharan Africa Okafor et al (2022) highlights the relationship between FD and CAD. This study applied the PMG-ARDL through panel data. They pointed out the presence of TDH in Sub-Sahara-Africa. Moreover, the results also revealed that bi-directional casualty exists among CAD and FD, saving gap & CAD along with uni-directional casualty that goes from FD to saving gap. For Tanzania Epaphra (2017) estimated the relationship between FD and CAD during 1966 to 2015 by applying the Vector Error Correlation Model and granger causality test. This study discovered the positive association between FD and CAD and the existence of unidirectional relationship among FD and CAD.

Yasmin (2015) discovered positive connection between the variables and causality running from CAD to BD ranging the data from 1990-2010. These results are reliable for Pakistan economy. Additionally, Hassan et al (2015) explored the testing relevance of TDH for a transition economy like Pakistan during 1972-2012. This study concluded that there is a positive and significance impact of BD on CAD. While on the other hand, during the long run and short run there is bidirectional causality among the BD and CAD by applying the Vector Error Correction Method. Ramu (2017) support the Keynesian Approach over the period from 1980–1981 to 2012–2013 in India whereas, Badaik and Panda (2020) concluded the validity of REH from 1970-2012. For the same country, Banday and Aneja (2016) checked the THD from 1990 to 2013 and observed that there is bidirectional causality found between the variables.

3. Model, Data & Methodology

A reliable formation of statistics methodology there is need to the accuracy of research data analysis. Mostly, by employing the authentic evaluation methods for the empirical investigation, accurate data sources are to be necessary. After analyzed the empirical studies of different internal and external researchers on TDH, a number of research regarding the TDH have been acknowledged to explain the relationship between FD and CAD along with the different macro-economic variables.

3.1 Model Specification

This section has an objective to evaluate the TDH in the context of selected developing countries by applying the panel data. On the basis of the association between dependent and independent variables this paper recognized the following model.

$$CAB = f(FD, REER, GFCF, GDPPCG, TRADE) \quad (3.1)$$

The econometric form of the functional form can be expressed as:

$$CAB = \beta_0 + \beta_1 FD + \beta_2 REER + \beta_3 GFCF + \beta_4 GDPPCG + \beta_5 TRADE + \varepsilon \quad (3.2)$$

Where, β_0 shows the intercepted term, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are regression constants and all variables of the model are defined as,

CAB = Current Account Balance (% of GDP)

FD = Fiscal Deficit (% of GDP)

REER = Real Effective Exchange Rate (index (2010 = 100))

GFCF = Gross Fixed Capital Formation (annual %)

GDPPCG = GDP per capita Growth (annual %)

Trade = Trade (% of GDP)

3.2 Data

Obtainability of trustworthy and sufficient data is the most important for the significant investigation. The soundness of consequences depends on adequate and reliable data. The aims of this study are examined by using the panel data over the period from 2000 to 2020 which is collected from World Bank Indicator (WDI).

3.3 Methodology: Panel ARDL

In order to investigate the relationship between BD and CAD we would apply the different econometric techniques. The first step we would apply the Augmented Dickey Fuller (ADF) test in order to check the stationarity of the variables. Secondly, we would apply the panel ARDL test to estimates the long-run and short-run relationship between dependent and independent variables.

General Equation for ARDL

$$\begin{aligned} \Delta(CAB)_{it} = & \alpha + \beta_1(CAB)_{it-1} + \beta_2(FD)_{it-1} + \beta_3(REER)_{it-1} + \beta_4(GFCF)_{it-1} \\ & + \beta_5(GDPPCG)_{it-1} + \beta_6(TRADE)_{it-1} + \sum_{i=1}^{k_1} \delta_1 \Delta(CAB)_{it-i} + \sum_{i=0}^{k_2} \delta_2 \Delta(FD)_{it-i} \\ & + \sum_{i=0}^{k_3} \delta_3 \Delta(REER)_{it-i} + \sum_{i=0}^{k_4} \delta_4 \Delta(GFCF)_{it-i} + \sum_{i=0}^{k_5} \delta_5 \Delta(GDPPCG)_{it-i} + \sum_{i=0}^{k_6} \delta_6 \Delta(TRADE)_{it-i} \end{aligned} \quad (3.3)$$

Long Run ARDL

$$\begin{aligned} \Delta(CAB)_{it} = & \alpha + \sum_{i=1}^{k_1} \eta_1 (CAB)_{it-i} + \sum_{i=0}^{k_2} \eta_2 (FD)_{it-i} + \sum_{i=0}^{k_3} \eta_3 (REER)_{it-i} \\ & + \sum_{i=0}^{k_4} \eta_4 (GFCF)_{it-i} + \sum_{i=0}^{k_5} \eta_5 (GDPPCG)_{it-i} + \sum_{i=0}^{k_6} \eta_6 (TRADE)_{it-i} + \varepsilon_{it} \end{aligned} \quad (3.4)$$

Short Run ARDL

$$\begin{aligned} \Delta(CAB)_{it} = & \alpha + \sum_{i=1}^{k_1} \phi_1 \Delta(CAB)_{it-i} + \sum_{i=0}^{k_2} \phi_2 \Delta(FD)_{it-i} + \sum_{i=0}^{k_3} \phi_3 \Delta(REER)_{it-i} \\ & + \sum_{i=0}^{k_4} \phi_4 \Delta(GFCF)_{it-i} + \sum_{i=0}^{k_5} \phi_5 \Delta(GDPPCG)_{it-i} + \sum_{i=0}^{k_6} \phi_6 \Delta(TRADE)_{it-i} \\ & + \omega ECM_{it-1} + \varepsilon_{it} \end{aligned} \quad (3.5)$$

4. Econometrics Analysis

This segment statistically assessment the models and delivers the mathematical consequences by apply the different approaches and econometrics techniques. This is the most important part for analyzed the different econometrics test.

4.1 Descriptive Statistics Analysis

Descriptive statistics analysis is the first part of the econometrics analysis which represents the summary of descriptive statistics of key variables.

Table 4.1 Descriptive Statistics of Key Variables for LIC (2000-2020)

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CAB	-9.46	12.14	-80.05	11.74	-2.5	13.09
FD	0.32	20.73	-21.66	5.84	0.4	5.34
REER	114.54	827.17	67.07	68.67	7.95	75.82
GFCF	24.67	2357.68	-46.22	180.68	12.57	162.57
GDPPCG	1.34	20.71	-31.34	4.97	-2.04	17.6
TRADE	69.74	311.36	25.04	41.49	3.54	18.83

Source: Author's calculations

In Table 4.1 denoted the average values of variables, CAB, FD, REER, GFCF, GDPPCG and Trade are -9.46, 0.32, 114.54, 24.67, 1.34 and 69.74 for low-income countries. On the other side, following are the maximum and minimum values of CAB is stayed within 12.14 (Gambia) and -80.05 (Liberia). Likewise FD remained between 20.73 (Gambia) & -21.66 (Burkina Faso), REER 827.17 (Congo, Dem. Rep.) & 67.07 (Malawi), GFCF 2357.68 (Sierra Leone) & -46.22 (Malawi), GDPPCG 20.71 (Sierra Leone) & -31.34 (Liberia) and trade are remained between 311.36 (Liberia) & 25.04 (Congo, Dem. Rep.). The values of the Kurtosis of all the variables for low-income countries are leptokurtic.

Table 4.2 Descriptive Statistics of Key Variables for LMC (2000-2020)

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CAB	-3.64	32.54	-43.77	8.18	-0.79	7.81
FD	1.82	84.99	-27.01	8.51	1.71	23.64
REER	86.49	150.36	10.00	23.72	-1.19	4.19
GFCF	6.79	66.17	-50.50	13.41	0.22	6.10
GDPPCG	3.17	30.36	-14.70	3.57	0.19	13.66
TRADE	80.71	184.69	21.12	32.74	0.42	2.57

Source: Author's calculations

In Table 4.2 exhibited the average values of CAB, FD, REER, GFCF, GDPPCG and trade are -3.64, 1.82, 86.49, 6.79, 3.17 and 80.71 for lower middle-income countries. Maximum and minimum value of CAB is stayed within 32.54 (Nigeria) and -43.77 (Mongolia). Similarly FD remained between 84.99 (El Salvador) & -27.01 (West Bank and Gaza), REER 150.36 (Bolivia) & 10.00 (Kyrgyz Republic), GFCF 66.17 (Mongolia) & -50.50 (Ukraine), GDPPCG 30.36 (Nigeria) & -14.70 (West Bank and Gaza) and trade 184.69 (Vietnam) & 21.12 (Nigeria). CAB, FD, REER, GFCF, GDPPCG the value of kurtosis in lower middle-income countries are leptokurtic. Whereas, the kurtosis value represents the distribution of data for trade is platykurtic.

Table 4.3 Descriptive Statistics of Key Variables for UMC (2000-2020)

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CAB	-3.42	20.96	-32.45	9.10	-0.41	3.96
FD	3.04	114.10	-10.02	10.45	7.63	76.86
REER	97.17	173.25	53.08	17.93	1.09	6.19
GFCF	5.11	50.51	-36.64	10.51	0.14	4.32
GDPPCG	2.90	13.69	-9.22	3.74	-0.04	3.23
TRADE	81.41	220.41	22.11	33.56	0.82	4.35

Source: Author's calculations

In Table 4.3 denoted the average values of CAB, FD, REER, GFCF, GDPPCG and Trade are -3.42, 3.04, 97.17, 5.11, 2.90 and 81.41 for upper middle-income countries. On the other extreme, maximum and minimum values of CAB is stayed within 20.96 (Gabon) and -32.45 (Grenada). Likewise, FD remained between 114.10 (Bulgaria) & -10.02 (Colombia and Botswana), REER 173.25 (Turkey) & 53.08 (Russian Federation), GFCF 50.51 (Romania) & -36.64 (Romania), GDPPCG 13.69 (Kazakhstan) & -9.22 (Botswana) and trade remained between 220.41 (Malaysia) & 22.11 (Brazil). The value of the Kurtosis of all the variables for upper middle-income countries is leptokurtic.

Table 4.4 Descriptive Statistics of Key Variables for All Developing Countries (2000-2020)

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CAB	-4.43	32.54	-80.05	9.48	-1.28	9.79
FD	2.09	114.10	-27.01	8.86	5.80	72.28
REER	95.65	827.17	10.00	34.25	10.56	209.34
GFCF	8.75	2357.68	-50.50	71.69	31.21	1021.72
GDPPCG	2.79	30.36	-31.34	3.94	-0.68	12.72
TRADE	79.37	311.36	21.12	34.85	1.32	7.45

Source: Author's calculations

In Table 4.4 revealed the average values of CAB, FD, REER, GFCF, GDPPCG and trade are - 4.43, 2.09, 95.65, 8.75, 2.79 and 79.37 for all developing countries. The values of maximum and minimum of CAB is stayed within 32.54 (Nigeria) and -80.05 (Liberia). FD remained between 114.10 (Bulgaria) and -27.01 (West Bank and Gaza), REER 827.17 (Congo, Dem. Rep.) and 10.00, (Kyrgyz Republic), GFCF 2357.68 (Sierra Leone) and -50.50 (Ukraine), GDPPCG 30.36 (Nigeria) and -31.34 (Liberia) and trade remained between 311.36 (Liberia) and 21.12 (Nigeria). The value of the Kurtosis of all the variables expressed leptokurtic in all developing countries.

4.2 Correlation Analysis

Correlation analysis represents the ⁵ relationship between dependent and independent variables. Data of all the variables accumulated from World Development Indicator (WDI) over the period from 2000 to 2020.

Table 4.5 Correlation Matrix of Key Variables for LIC (2000-2020)

Correlation	CAB	FD	REER	GFCF	GDPPCG	TRADE
CAB	1.00					
FD	-0.08	1.00				
REER	0.07	-0.14	1.00			
GFCF	-0.08	-0.06	0.01	1.00		
GDPPCG	-0.01	-0.21	-0.12	0.06	1.00	
TRADE	-0.51	0.35	-0.08	-0.03	0.05	1.00

Source: Author's calculations

Table 4.5 represents the correlation matrix of key variables for low-income countries. CAB has a positive correlation with REER while there is a negative correlation with FD, GFCF, GDPPCG and Trade. FD has a positive correlation with trade whereas; there is a negative correlation with REER, GFCF and GDPPCG. REER ¹ has a positive correlation with GFCF; on the other hand there is a negative correlation with GDPPCG and Trade. GFCF has a positive correlation with GDPPCG. However, there is a negative correlation with Trade. GDPPCG has a positive correlation with the Trade. The positive correlation of Trade is exists with all variables.

Table 4.6 Correlation Matrix of Key Variables for LMC (2000-2020)

Correlation	CAB	FD	REER	GFCF	GDPPCG	TRADE
CAB	1.00					
FD	0.24	1.00				
REER	0.17	0.17	1.00			
GFCF	0.01	0.06	-0.03	1.00		
GDPPCG	0.03	0.05	-0.10	0.41	1.00	

¹¹ TRADE	-0.20	0.11	-0.19	0.09	0.10	1.00
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Source: Author's calculations

The above table 4.6 expressed the correlation matrix of key variables for the lower middle-income countries given the period from 2000 to 2020. CAB has a positive correlation with FD, REER, GFCF and GDPPCG while there is a negative correlation with Trade. FD has a positive correlation whereas REER has negative correlation with all the respective variables. GFCF, GDPPCG and trade have has a positive correlation with all respective variables.

Table 4.7 Correlation Matrix of Key Variables for UMC (2000-2020)

Correlation	CAB	FD	REER	GFCF	GDPPCG	TRADE
CAB	1.00					
FD	-0.08	1.00				
REER	0.01	0.02	1.00			
GFCF	0.10	-0.05	0.01	1.00		
GDPPCG	0.07	-0.07	0.07	0.54	1.00	
TRADE	0.02	0.20	0.00	-0.01	0.04	1.00

Source: Author's calculations

Table 4.7 demonstrated the correlation matrix of key variables for the upper middle-income countries over the period from 2000 to 2020. CAB has a positive correlation with all variables except FD. FD has a positive correlation with REER and Trade while on the other hand there is a negative correlation with GFCF and GDPPCG. REER, GDPPCG and trade have positive correlation with all other variables. GFCF has a positive correlation with GDPPCG and negative correlation with Trade.

Table 4.8 Correlation Matrix of Key Variables for All Developing Countries (2000-2020)

Correlation	CAB	FD	REER	GFCF	GDPPCG	TRADE
CAB	1.00					
FD	0.05	1.00				
REER	0.02	0.01	1.00			
GFCF	-0.05	-0.03	0.03	1.00		
GDPPCG	0.07	-0.04	-0.09	0.08	1.00	
TRADE	-0.14	0.20	-0.10	-0.02	0.08	1.00

Source: Author's calculations

Table 4.8 represented the correlation of matrix of key variables for the all developing countries given the period from 2000 to 2020. CAB has a positive correlation with FD, REER and GDPPCG whereas; there is a negative correlation with GFCF and Trade. FD has a positive correlation with two variable (REER and Trade) while has negative correlation with GFCF and GDPPCG. REER has a positive correlation with GFCF whereas; there is a negative correlation

with GDPPCG and Trade. GFCF has a positive correlation with GDPPCG and negative with Trade. GDPPCG has a positive correlation with Trade. Trade has a positive correlation with CAB, FD, REER, GFCF and GDPPCG.

4.3 Panel Unit Root Tests

Panel unit root test is applied in order to check the stationarity and order of integration of different macro-economic variables. This study applied the two tests i.e. LLC (Levin, Lin and Chu) proposed by Levin et al. (2002) and other is IPS (Im, Pesaran & Shin) recommended by Im et al. (2003) with trend and without trend. The LLC test represents that slopes are homogeneous. IPS method adopts that slopes are heterogeneous. Table 5.9 showed the results of panel unit root test of all the variables i.e. CAB, FD, REER, GFCF, GDPPCG and trade.

Table 4.9 Results of Panel Unit Root Test

With Trend					
Variable	LLC test		IPS Test		Results
	At Level	At 1 st Diff.	At Level	At 1 st Diff.	
CAB	-4.63257 0.0000	-	-3.47222 0.0003	-	I(0)
FD	-3.08260 0.0010	-	-1.24201 0.1071	-24.6243 0.0000	I(1)
REER	0.64513 0.7406	-27.3905 0.0000	0.37918 0.6477	-20.3652 0.0000	I(1)
GFCF	-42.4222 0.0000	-	-23.4283 0.0000	-	I(0)
GDPPCG	-18.1548 0.0000	-	-17.2793 0.0000	-	I(0)
TRADE	-1.47940 0.0695	-31.0330 0.0000	-0.30224 0.3812	-25.9639 0.0000	I(1)

Without Trend			
Variable	LLC test	IPS Test	Results

	At Level	At 1 st Diff.	At Level	At 1 st Diff.	
CAB	-5.94190 0.0000	-	-2.66758 0.0038	-	I(0)
FD	-3.60631 0.0002	-	2.03044 0.9788	-20.5609 0.0000	I(1)
REER	0.43670 0.6688	-24.8873 0.0000	2.50013 1.0000	-15.7637 0.0000	I(1)
GFCF	-37.4452 0.0000	-	-20.3272 0.0000	-	I(0)
GDPPCG	-18.0141 0.0000	-	-13.9120 0.0000	-	I(0)
TRADE	-2.67767 0.0037	-	1.03554 0.8498	-22.2708 0.0000	I(1)

1

Source: Author's calculations

The results of the panel unit root test are showed in table 4.9. According to the analysis through two different tests (LLC and IPS) some variables i.e. CAB, GFCF and GDPPCG are found stationary at level. While on the other side some variables i.e. FD, REER and Trade are found stationery at first difference. Henceforth, due to the mixture of results allow to incorporate the ARDL econometric technique in order to check the long-run & short-run analysis.

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4.4 Long Run Analysis

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The result represents the existence of long-run relationship between dependent and independent variables. The long-run ARDL estimation of twin deficit model as the case of LIC, LMC, UMC and all developing countries, over the period from 2000 to 2020 expressed as under.

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Table 4.10 Long Run ARDL Estimates of Twin Deficit Model

Dependent Variable: CAB				
Variable	LIC	LMC	UMC	ALL
FD	0.5907 (0.0006)	-1.0431 (0.0042)	0.0200 (0.3824)	-0.1308 (0.0370)
REER	-0.0143 (0.0049)	14.7690 (0.0567)	0.0090 (0.0884)	0.0151 (0.2960)
GFCF	-0.0039 (0.8297)	-1.1556 (0.0000)	-0.0135 (0.7369)	-1.7573 (0.0000)

GDPPCG	-0.4354 (0.0072)	1.2060 (0.0001)	0.0745 (0.4698)	0.6327 (0.1000)
TRADE	-0.0774 (0.001)	0.1910 (0.9547)	0.0379 (0.0094)	0.0841 (0.0000)

Source: Author's calculations

The relationship between CAB and FD is positive and significant for LIC and UMC (see for example, Hussain et al. (2023), Mehta and Mallikarjun (2023), Chinweuba (2022), Nautiyal et al. (2022), Mukhtar et al. (2021), Abbasi et al. (2021), Rehman et al. (2020), Samotu and Orisadare (2020)). However, there is an inverse coefficient found for LMC and all developing countries (see for example, Samsu and Ismail (2020), Damalie and Daniel (2019)). For instance if 1% increases in FD than CAB increase by 0.59 % for LIC and 0.020% for UMC, On the other side if an unit increase in FD than CAB decline by 1.04% for LMC and 0.13% for all developing countries. These findings also represented the Theory of Keynesian Proposition is more appropriate for LIC and UMC (see for example, Nautiyal et al., 2022), Baharumshah et al. (2019), Mohanty (2019), Ravinthirakumaran et al. (2015)). However, the Theory of Ricardian Equivalence Hypothesis is more suitable for LMC and all developing countries (see for example, Kafle et al. (2022), Badaik and Panda (2020), Chunming & Ruo (2015), Mohammadi & Moshref (2012)).

There is a positive and significant relationship found between REER and CAB, as case of LMC, UMC and for all developing countries (see for example, Mehta and Mallikarjun (2023), Okafor et al. (2021), El-Khishin and El-Saeed (2021), Anantha Ramu (2017)). Moreover, negative relationship found only for LIC (see for example, Jayasooriya (2020), Damalie and Daniel (2019), Banday and Aneja (2019), Oshota and Badejo (2015)). If a one percent point increase in REER as a result CAB decline by 0.01% for LIC. Likewise, CAB increases by 14.76% for LMC and 0.009% for UMC and 0.015% for all developing countries.

The coefficient variable GFCF is negatively affects the CAB all cases i.e. LIC, LMC, UMC and all developing countries (see for example, Abbasi et al. (2021), Rehman et al. (2020), Saba (2015), Hassan et al. (2015)). If 1 unit increase in GFCF can generates 0.003% for LIC, 1.15% for LMC, 0.013% for UMC and 1.75 % for all developing countries decline in CAB.

GDPPCG is positively influence the CAB for LMC, UMC and all developing countries (see for example, Mukhtar et al. (2021), Khan et al., (2017), Sakyi and Opoku (2016), Oshota and Badejo (2015)). How negative sign found for LIC (see for example, Samsu and Ismail (2020)). If there is 1% increase in GDPPCG than CAB will be raised by 1.20% for LMC, 0.074% for UMC and 0.63% for all developing countries. However, CAB decline by 0.43% for LIC.

Nevertheless, there is a positive long-run connection found between trade and CAB for LMC, UMC and all developing countries (see for example, [Mehta and Mallikarjun \(2023\)](#), [El-Khishin and El-Saeed \(2021\)](#)). Whereas, negative sign create for LIC economies (see for example, [Mukhtar et al. \(2021\)](#), [Bon \(2014\)](#)). If there is 1% increase in trade improved the CAB by 0.19% for LMC, 0.037% for UMC and 0.084% for all developing countries, in the same way CAB decline by 0.077% for LIC.

4.5 Short Run Analysis

This section represents the short-run relationship between CAB, FD, REER, GFCF, GDPPCG and trade variables. Table 4.11 short-run showed the short-run ARDL estimation of twin deficit model. In this model we will discuss the error correlation model (ECM).

Table 4.11 Short Run ARDL Estimates of Twin Deficit Model

Dependent Variable: CAB				
Variable	LIC	LMC	UMC	ALL
COINTEQ01	-0.5867 (0.0001)	-0.1874 (0.0000)	-0.4629 (0.0000)	-0.0792 (0.0000)
D(FD)	-0.0032 (0.9918)	0.0857 (0.7983)	0.1200 (0.1199)	0.0101 (0.9157)
D(REER)	-0.0797 (0.3006)	0.0210 (0.3711)	0.0464 (0.2639)	-0.0414 (0.0484)
D(GFCF)	0.0449 (0.0002)	0.0924 (0.0020)	-0.0442 (0.0887)	0.0252 (0.0866)
D(GDPPCG)	0.1869 (0.1400)	-0.1814 (0.0634)	0.1008 (0.2272)	-0.0035 (0.9459)
D(TRADE)	-0.1199 (0.5085)	-0.1201 (0.0065)	0.0619 (0.0846)	-0.0593 (0.0512)
C	-1.3700 (0.5757)	-7.3827 (0.0001)	1.1263 (0.0556)	-----

Source: Author's calculations

The table 4.11 showed that there are four equations used for the selected developing countries i.e. LIC, LMC, UMC and developing countries. The variable CAB in the prior-equation which represents in the above table 4.11 the value of ARDL estimates of twin deficit model for LIC is -0.5867, LMC -0.1874, UMC -0.4629 and for the all developing countries is -0.0792. Equation for LIC showed that long-run equilibrium observed short-run shock which is adjusted within five month, LMC within one month and eight weeks, UMC four months and six weeks,

all developing countries within seven weeks. The results also showed that GFCF and GDPPCG affect the CAB positively and significantly for LIC, FD, REER, and GFCF for LMC, all variables except GFCF for UMC, FD and GFCF for all developing countries are the most significant variables that influencing the CAB. Moreover, the coefficient of the intercept is negative for LIC i.e. (-1.3700) along with probability 0.5757. For LMC is also negative (-7.3827), and the probability is 0.0001. However, there is a positive coefficient of intercept found for UMC economies i.e. (1.1263) which probability is 0.0556.

5. Conclusions and Policy Recommendations

This paper try to investigates the relationship between BD and CAD both in long-run and short-run for selected developing economies by employing the panel data period from 2000 to 2020. Moreover, this paper also try to examine that weather the Keynesian theory of Proposition or Ricardian Equivalence Hypothesis (REH) is more appropriate for developing economies. First, we would apply the Augmented Dickey Fuller (ADF) test in order to check the stationarity between the variables. The results of ADF represent that some variables i.e. CAB, GFCF and GDPPCG are found stationary at level. While on the other side some variables i.e. FD, REER and Trade are found stationery at first difference. Thus, we would employ the ARDL econometrics technique in order to check the long-run and short-run association between variables.

The finding shows that FD is positive and significant impact on CAB for LIC and UMC. However, there is a negative coefficient found for LMC and all developing countries. There is positive association between REER and CAB found for LMC, UMC and all developing countries. Moreover, there is insignificant relationship found for LIC. GFCF negatively affects the CAB for all cases. GDPPCG and Trade are positive and significant for LMC, UMC and all developing countries except LIC. This paper also pointed out that theory of Keynesian Proposition is more appropriate for LIC and UMC. However, Ricardian Equivalence Hypothesis is more suitable for LMC and all developing countries. It is also come into know after the study of developing countries that they face the huge CAD & can't be revert without bringing about structural change of the country from less skill to high skill & from less technology to high technology.

From the policy developments; the authorities of these countries should decrease the BD by spreading the area of taxes, decrease the expenditures as well as government should promote the economic growth. If a rise in economic growth as a result government tax will be increased in the shape of direct and indirect tax, corporation tax, income tax etc. High growth rate will

decrease the FD. If the FD decreases CAD will also be decrease. The government should also expand the value of exports at increasing their businesses and encourage the import substitution industry by generating the favorable environments. In the home country an increase in export and import substitutes will enhance the domestic production, employment and earnings, which as a result widening the export performance and worsening the imports volume. If above said strategies implemented in the better way it will decrease the FD and improve the CAD into the country.

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