



An Empirical Analysis of Twin Deficits Hypothesis, Ricardian Equivalence and Feldstein-Horioka Puzzle: The case of Bangladesh

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○ What is the Twin Deficits Hypothesis?

- Simultaneous deterioration of Budget and Current Account Deficits
 - Particularly, Budget Deficit attributing to Current Account Deficit
- First came into consideration in the 1980's following the persistent deterioration of these two deficits in the **USA**



BUDGET DEFICIT

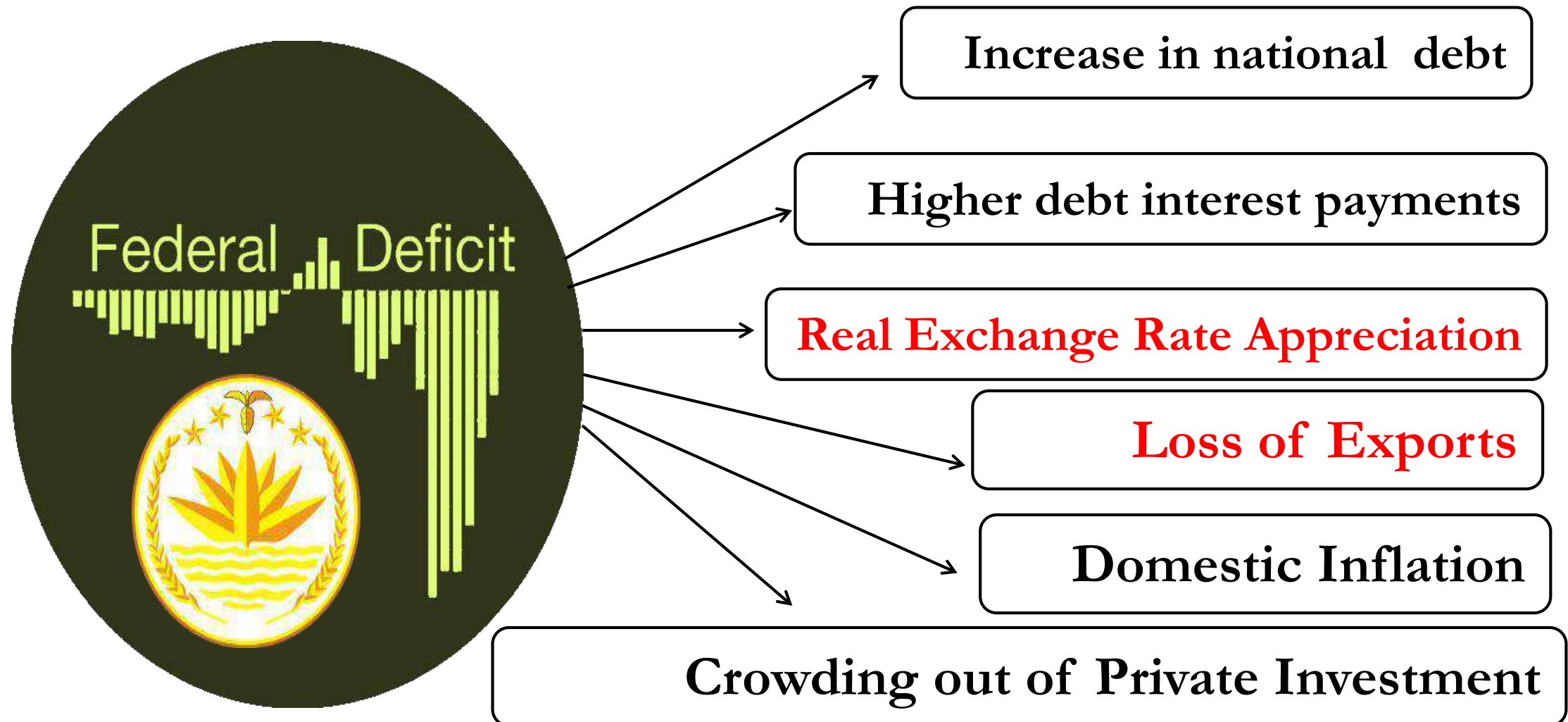


CURRENT ACCOUNT DEFICIT

○ BUDGET DEFICIT

- A state when the government's proposed expenditure budget is less than its anticipated domestic public revenue

PROBLEMS



○ CURRENT ACCOUNT DEFICIT

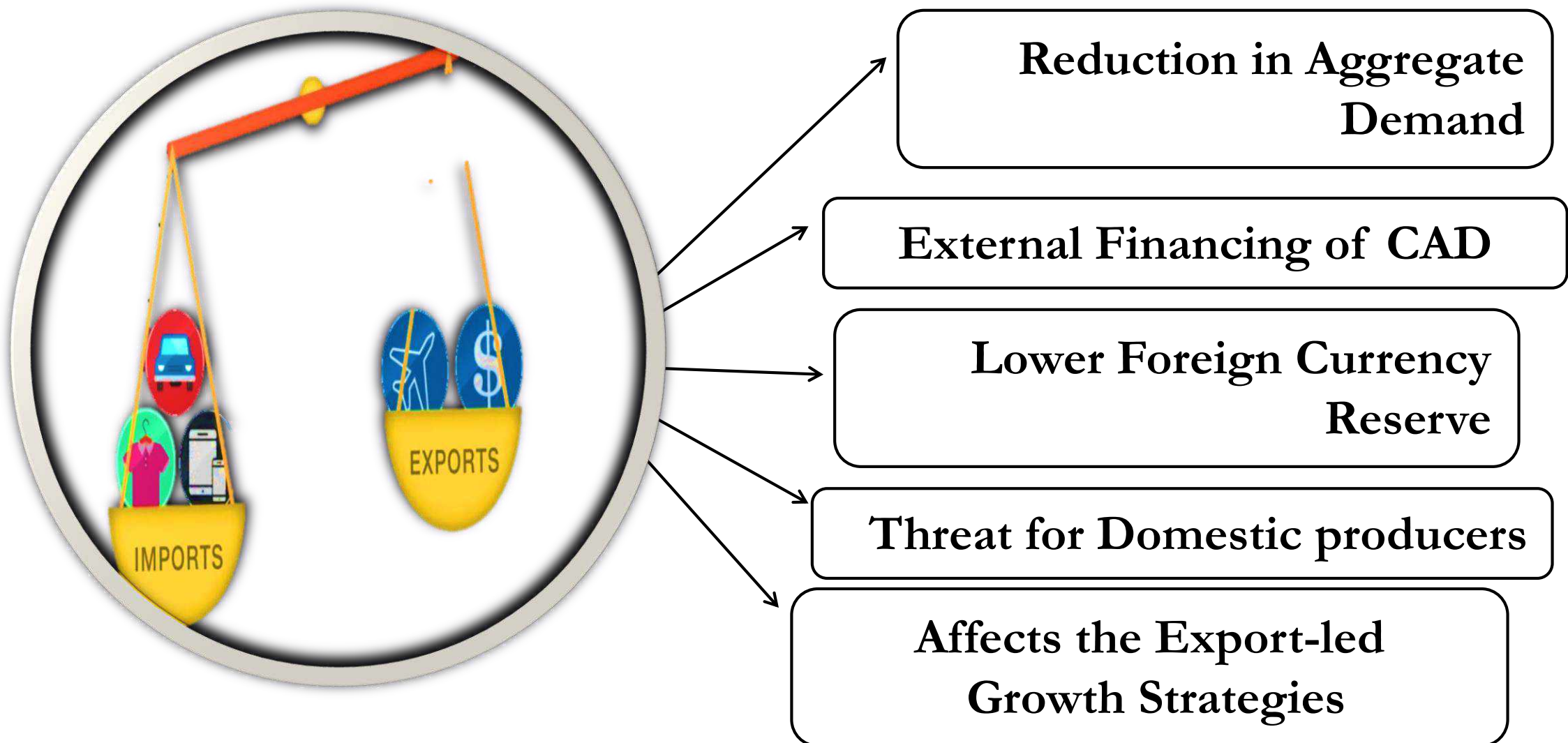
○ A state when the value of imports exceeds the value of exports

○ The current account consists of the :

- **balance of trade**
- **net primary income or factor income** (earnings on foreign investments minus payments made to foreign investors) and net cash transfers, that have taken place over a given period of time.
- The current account balance is one of two major measures of a country's foreign trade (the other being the net capital outflow).

○ CURRENT ACCOUNT DEFICIT

PROBLEMS

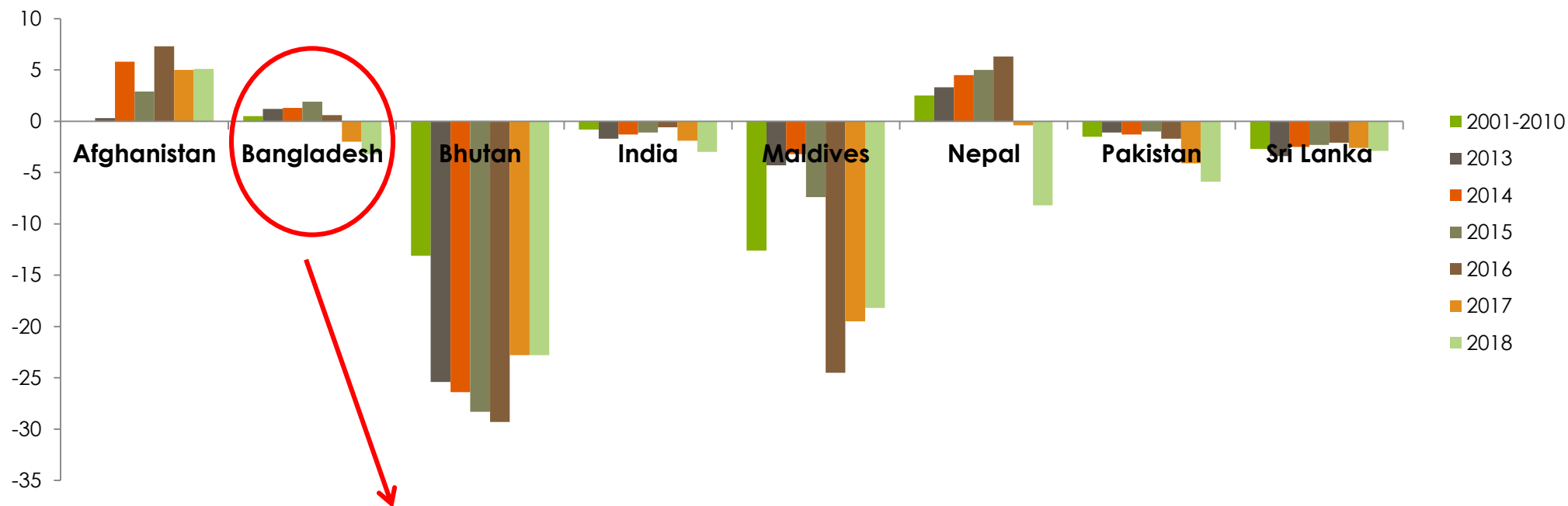


Keeping the negative impacts of the TWIN DEFICITS into consideration:

- This paper aims to analyze the possibility of the Twin Deficit Hypothesis existing in **Bangladesh** following the nation's persistent **deterioration in Budget Deficits and recent Current Account Deficits**
- The contribution to the literature is in terms of the evaluation of the Twin Deficits Hypothesis in light of the **Ricardian Equivalence** and **Feldstein-Horioka Puzzle** exclusively in the context of Bangladesh.

Historical Trends

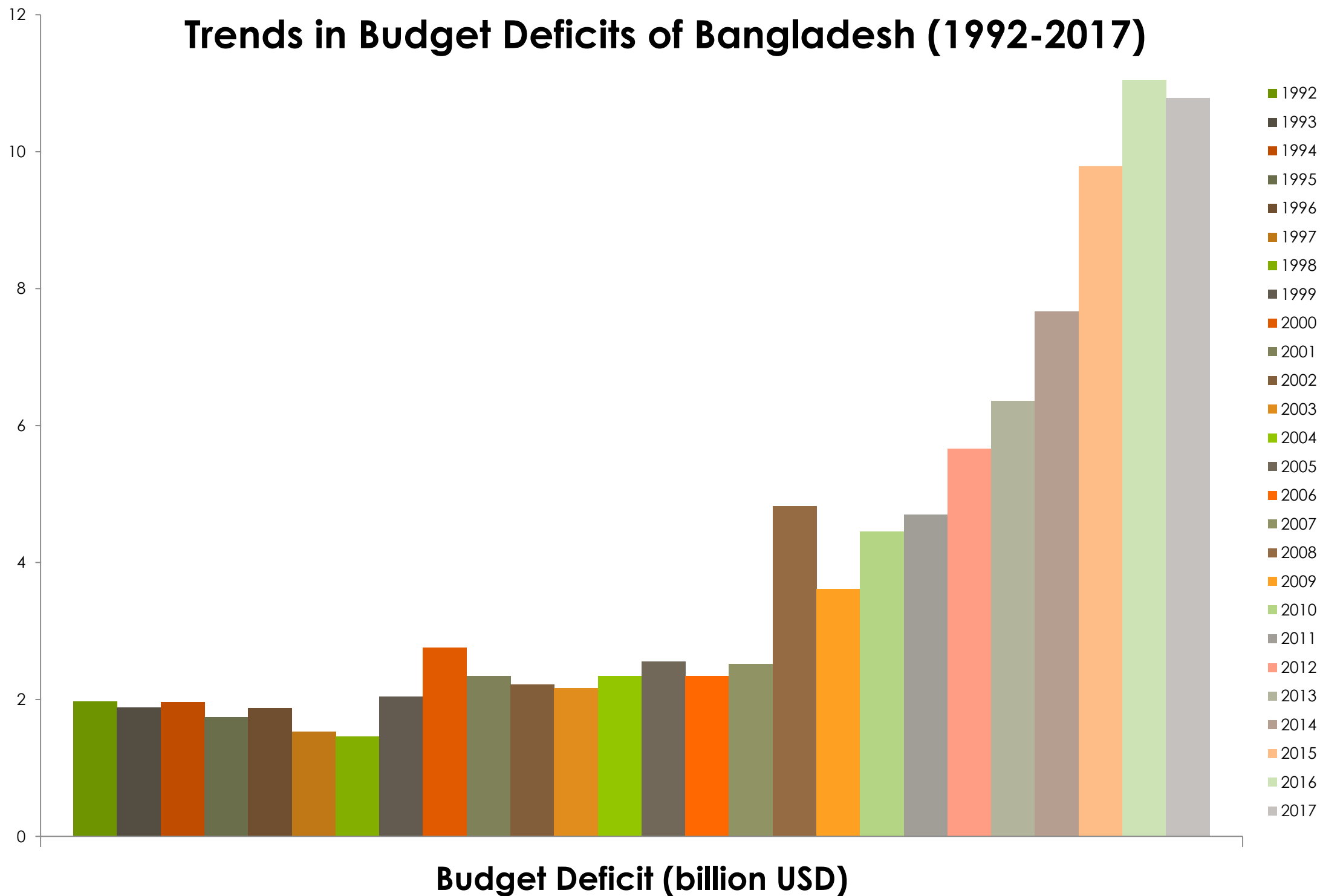
Current Account Balance Trends in South Asia (2001-2018)



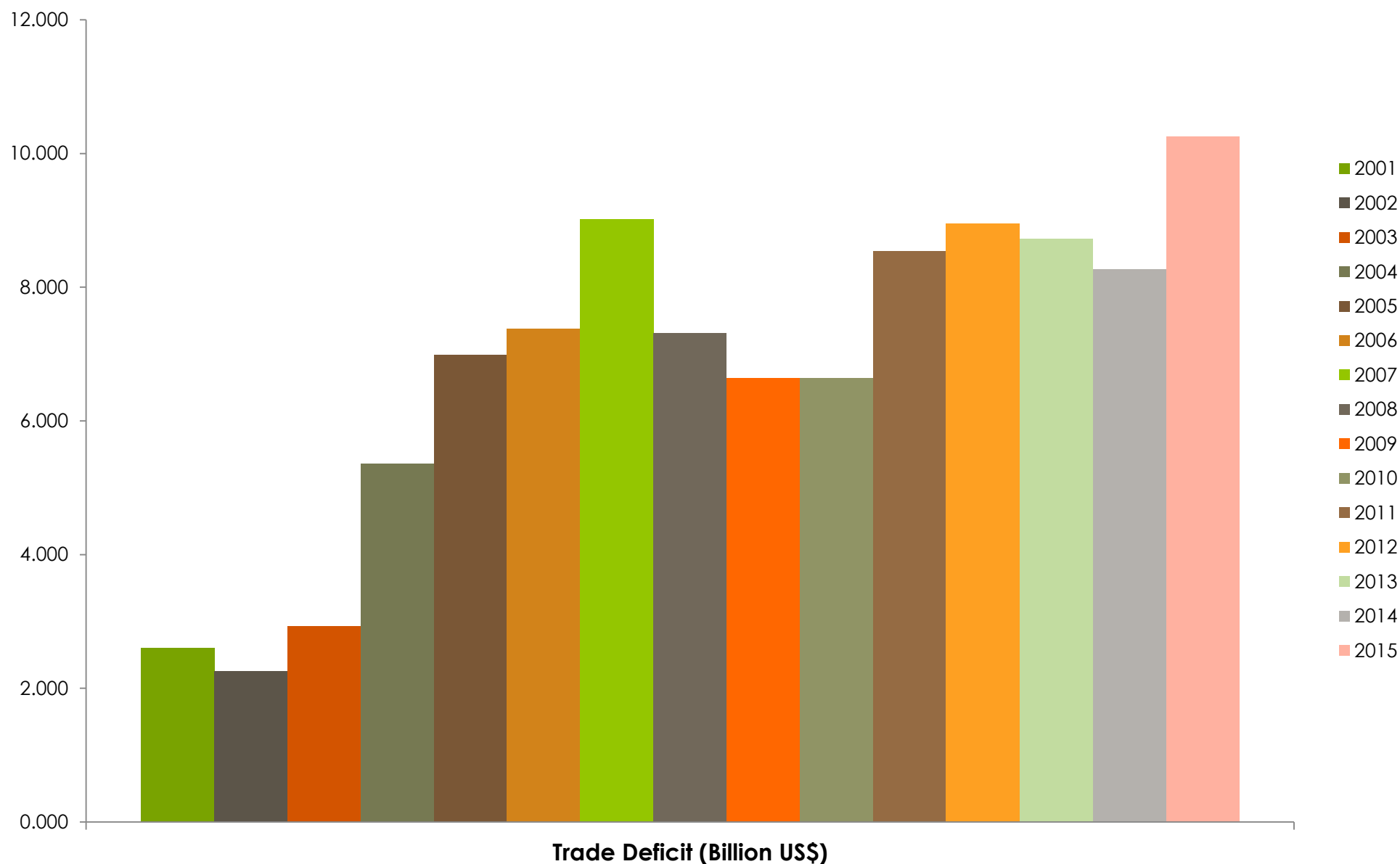
Current Account Balance Trend of Bangladesh (2001-2018)



Trends in Budget Deficits of Bangladesh (1992-2017)



Trade Deficit Trends of Bangladesh (2001-2015)



BUDGET DEFICIT



CURRENT ACCOUNT DEFICIT

Mundell-Fleming Model

- A rise in **Budget Deficit** raises domestic interest rate
- Foreign capital inflow
- Real Exchange rate appreciate
- Exports fall; Imports Rise
- **Current Account deficit** worsens

Robert Mundell



Marcus Fleming



BUDGET DEFICIT

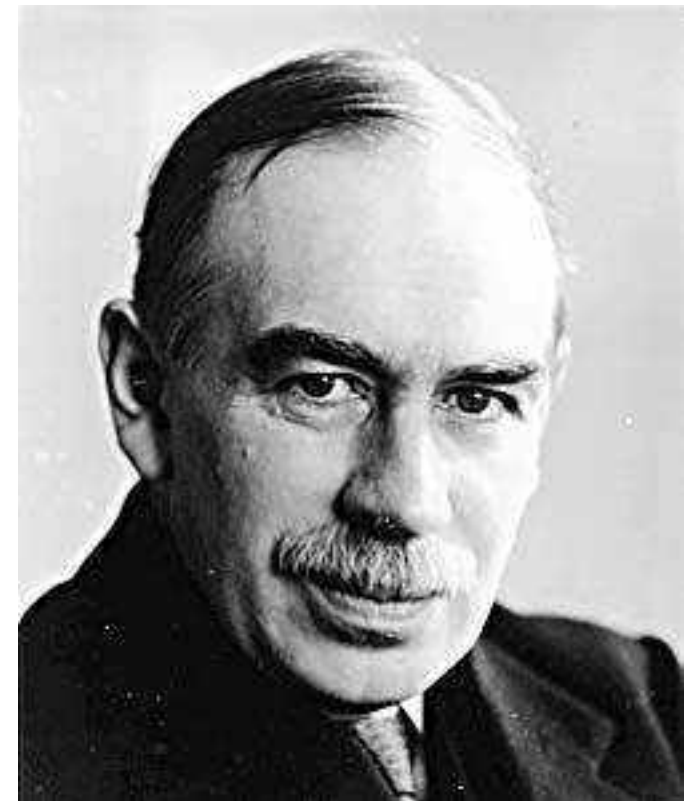


CURRENT ACCOUNT DEFICIT

Keynesian Absorption Theory

- Keynesian economics advocates in favor of greater government expenditure
- As **Budget deficit** increases government tends to reduce taxation efforts
- Disposable income increases and demand for imported goods rise
- Imports outpace exports
- **Current account deficit**

John Maynard
Keynes



BUDGET DEFICIT



**CURRENT
ACCOUNT
DEFICIT**

Ricardian Equivalence

Robert Barro

- Put forward by Robert Barro (1974)
- Government's financing strategies are ineffective in influencing consumption behavior
- A tax cut at present is viewed as a tax hike in future
- **No change** in interest rate and real exchange rate
- Thus, **Budget deficit is unlikely to result in current account deficit** in the presence of Ricardian Equivalence



BUDGET DEFICIT



CURRENT ACCOUNT DEFICIT

Feldstein-Horiokka Puzzle

- Domestic savings and investment are **uncorrelated (i.e. the puzzle)** under perfect capital mobility across national boundaries
- In the absence of Ricardian equivalence, as **Budget deficit** rises domestic savings and investments would decline resulting in capital flights
- Foreign currency would flow in as International Financial Assistance to bridge the fiscal deficit
- Real exchange rate would appreciate
- Exports fall; Imports rise
- **Current Account Deficit** worsens

Martin Feldstein



Charles Horioka



Deriving the simple linkage between budget and current account deficits:

- National Income Accounting:**

$$Y = C + I + G + (X - M) \text{ ---- (i)}$$

- GDP utilization equation:**

$$Y = C + S + T \text{ ---- (ii)}$$

- Equating equations (i) & (ii):**

$$(I - S) + (G - T) = (M - X)$$

↓	↓	↓
Investment – Savings Gap	Budget Deficit	Current Account Deficit

where
 $Y = \text{GDP}$
 $C = \text{Consumption}$
 $I = \text{Private Investment}$
 $G = \text{Govt. Expenditure}$
 $(X - M) = \text{Net Exports}$

If $\Delta(I - S) = 0$ → Ricardian Equivalence holds



$\Delta(G - T) = \Delta(M - X)$
 Twin Deficits Hypothesis holds

Budget Deficit and Current Account Deficit are **positively correlated** in the context of Turkey; Evidence of Twins Deficit Hypothesis (Halicioglu and Eren 2017)

A **reverse causality** running from Current Account Deficit to Budget Deficit was found in Nigeria; **No evidence of Twin Deficits Hypothesis** (Onafowora and Owoye 2006)

The notion of Ricardian Equivalence was **not held to be true and therefore the statistical estimates advocated in favor of the Twin Deficits Hypothesis** taking place in Indonesia (Adji and Alm 2006)

Budget Deficit and Current Account Deficit are **positively associated** in the context of Sierra Leone (Chapman, *et al.*, 2017)

- Following Perelman and Pestieau (1993)

Ricardian Equivalence Model:

$$C_t = \beta_0 + \beta_1 (Y-T)_t + \beta_2 BD_t + \beta_3 GDEBT_t + \beta_4 NSAVE_t + \beta_5 INF_t + \varepsilon_t \text{ ----- (i)}$$

Feldstein-Horioka Puzzle Model:

$$DINV_t = \alpha_0 + \alpha_1 NSAVE_t + \alpha_2 GDPG_t + \alpha_3 PCON_t + \alpha_4 GI_t + \varepsilon_t \text{ (ii)}$$

Twin Deficits Hypothesis Model:

$$CAD_t = \gamma_0 + \gamma_1 BD_t + \gamma_2 RER_t + \gamma_3 GDPG_t + \gamma_4 INF_t + \gamma_5 GI_t + \varepsilon_t \text{ (iii)}$$

Data Sources

Variable	Description (units)	Data Source
C	Real Private Consumption (Million US\$)	Bangladesh Economic Review (2005, 2010, 2017)
(Y-T)	Real Disposable Income (Million US\$)	
BD	Budget Deficit (Million US\$)	
CAD	Current Account Deficit (Million US\$)	
GDEBT	Government Debt Burden (Million US\$)	
NSAVE	National Private Savings (Million US\$)	
INF	Domestic Inflation Rate (Percentage)	
GDPG	GDP Growth Rate (Percentage)	
PCON	Public Consumption (Million US\$)	
GINDEX	Globalization Index (Number)	
RER	Real Exchange Rate (BDT/US\$)	Statistical Yearbook of Bangladesh (2017)
DINV	Private Investment (Million US\$)	Bangladesh Economic Review (2005, 2010, 2017)

Data
Analysis
Techniques

Granger Causality Test

VECM Analysis

FMOLS Regression & Impulse Response Functions
Analysis

Johansen Cointegration Test

Augmented Dickey-Fuller Test

ADF Unit Root Test Results at First Differences, I(1)

Var.	ADF Statistic	P-value
First Difference I (1)		
C	-4.847	0.004
(Y-T)	-5.604	0.001
BD	-5.979	0.000
CAD	-6.022	0.000
GDEBT	-4.518	0.010
NSAVE	-5.541	0.001
INF	-5.623	0.001
GDPG	-5.411	0.013
PCON	-4.970	0.000
GINDEX	-3.964	0.001
RER	-4.279	0.013
DINV	-4.398	0.014

*** All the variables are stationary at their first**

Johansen Cointegration Test Results

Trace Test					
Model	Null Hypothesis	Alternative Hypothesis	Trace Statistic	95% Critical Value	Conclusions
(i)	$r = 0$	$r = 1$	102.162 **	95.754	1 cointegrating equation
	$r \leq 1$	$r = 2$	57.995	69.819	
(ii)	$r \leq 1$	$r = 2$	55.471 ***	47.856	2 cointegrating equations
	$r \leq 2$	$r = 3$	28.174	29.797	
(iii)	$r \leq 1$	$r = 2$	76.182 **	69.819	2 cointegrating equations
	$r \leq 2$	$r = 3$	40.313	47.857	
Maximum Eigen Value Test					
Model	Null Hypothesis	Alternative Hypothesis	Max. Eigen Stat.	95% Critical Value	Conclusions
(i)	$r = 0$	$r = 1$	44.167 **	40.078	1 cointegrating equation
	$r \leq 1$	$r = 2$	22.971	33.877	
(ii)	$r = 0$	$r = 1$	85.779 **	33.877	1 cointegrating equation
	$r \leq 1$	$r = 2$	27.297	27.584	
(iii)	$r \leq 1$	$r = 2$	35.869 **	33.877	2 cointegrating equations
	$r \leq 2$	$r = 3$	20.274	27.584	

* All the variables are associated in the long run

Fully Modified OLS Regression Results – Model (i)

Dependent Variable: LnC

Regressors	Coefficient
Ln(Y-T)	0.887 **
LnBD	-0.055
LnGDEBT	0.512
LnINF	-1.922 *
LnNSAVE	0.184 ***
Intercept	9.211 *
Adj. R2	0.797
S.E. of Regression	0.413

Findings:

- **Ricardian Equivalence does not hold**
- 1% rise in aggregate disposable income leads to a 0.887% rise in the total real private consumption on average, *ceteris paribus*.
- **Domestic Inflation negatively affects Private Consumption**
- **National Private Savings and Consumption are positively correlated**

Fully Modified OLS Regression Results – Model

(ii)

Dependent Variable: LnTIV

Regressors	Coefficient
LnNSAVE	0.560 **
LnGINDEX	3.207 *
LnGDPG	0.014
LnPCON	0.165 ***
Intercept	0.301
Adj. R2	0.817
S.E. of Regression	0.309

Findings:

- **Feldstein-Horioka Puzzle does not hold**
 - Domestic investment and savings are positively correlated
 - Savings-retention rate is almost **56%** in Bangladesh
 - **Moderate Capital Mobility** across boundaries
- **Globalization has a positive impact on Private Investments**
- **Public Investments facilitate Private Investments**

Fully Modified OLS Regression Results – Model (iii)

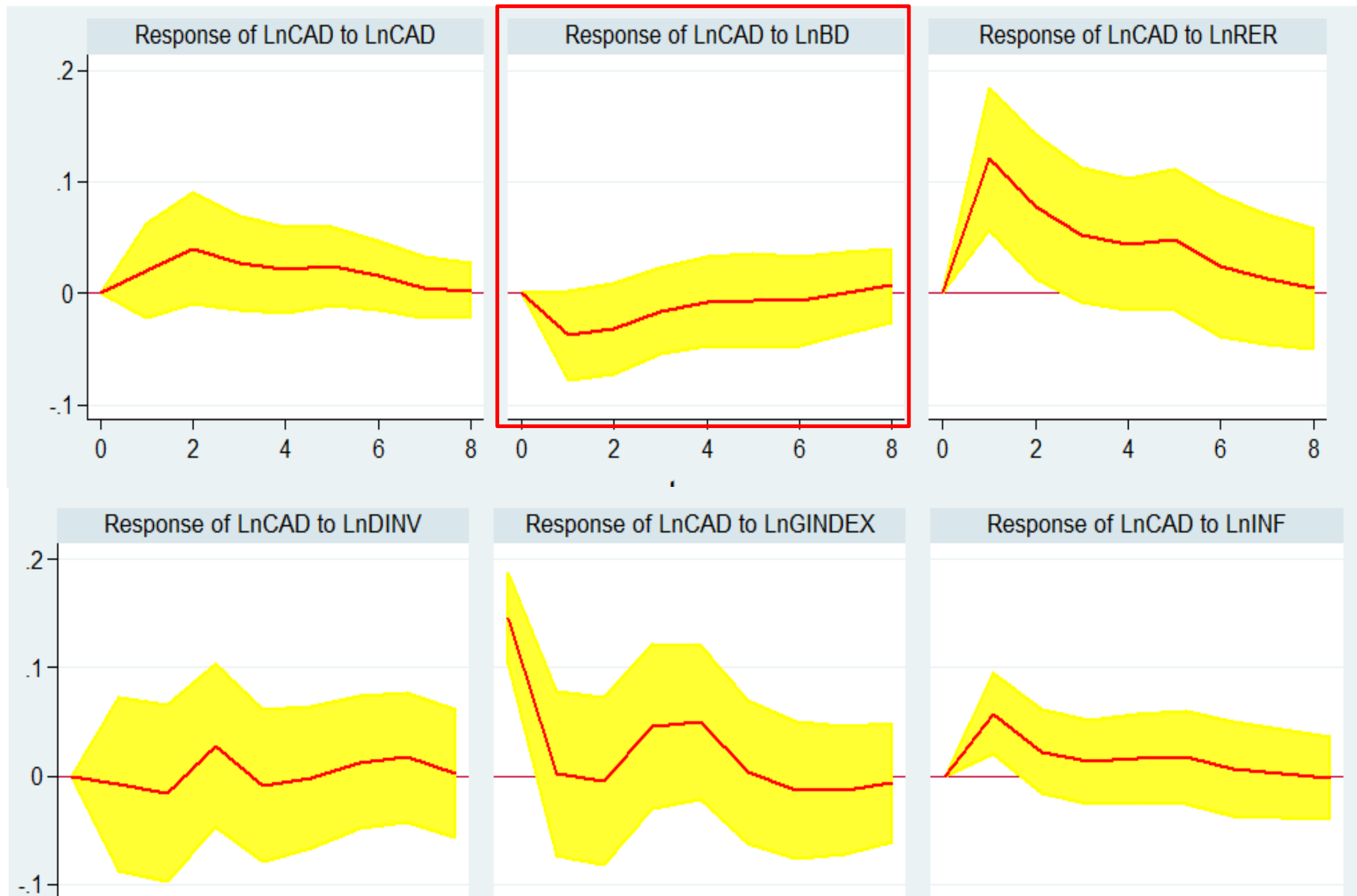
Dependent Variable: LnCAD

Regressors	Coefficient
LnBD	-0.152 *
LnTINV	-0.293 *
LnRER	1.209 **
LnINF	0.212 *
LnGINDEX	2.291
LnGDPG	-0.117 *
Intercept	1.642*
Adj. R2	0.879
S.E. of Regression	0.240

Findings:

- **Budget Deficit and Current Account Deficit are negatively correlated**
 - 1% rise in Budget Deficit leads to a 0.152% decline in the Current Account Balance on on average, *ceteris paribus*.
- Total private investment and economic growth reduce Current Account Deficit
- Domestic Inflation worsens Current Account Deficits

Impulse Response Function Analysis



Impulse Response Function Analysis (contd.)

step	Response of LnCAD to LnCAD			Response of LnCAD to LnBD		
0	0	0	0	0	0	0
1	.120247	.056415	.18408	-.038047	-.077938	.001845
2	.077245	.013116	.141374	-.032068	-.073008	.008873
3	.052171	-.008123	.112465	-.015933	-.054047	.022182
4	.043823	-.015462	.103109	-.007412	-.047509	.032684
5	.047604	-.015774	.110983	-.006904	-.04892	.035113
6	.024126	-.038472	.086723	-.007055	-.047341	.033232
7	.012391	-.04582	.070602	.000349	-.035928	.036626
8	.003986	-.050074	.058046	.006652	-.026639	.039942
step	Response of LnCAD to LnGINDEX			Response of LnCAD to LnDINV		
0	.145729	.103616	.187842	0	0	0
1	.002351	-.073065	.077768	-.007697	-.087159	.071765
2	-.005318	-.082474	.071837	-.01609	-.097716	.065537
3	.046003	-.030144	.12215	.027702	-.047433	.102838
4	.049839	-.020924	.120601	-.00878	-.078533	.060974
5	.003477	-.062264	.069219	-.001396	-.06622	.063428
6	-.013233	-.075936	.04947	.012702	-.048642	.074045
7	-.012721	-.071798	.046356	.017134	-.042403	.076671
8	-.00639	-.060891	.048111	.001974	-.05697	.060917
step	Response of LnCAD to LnRER			Response of LnCAD to LnINF		
0	0	0	0	0	0	0
1	.020291	-.021977	.062558	.057382	.020066	.094697
2	.040258	-.009201	.089717	.022274	-.016243	.060792
3	.02705	-.015102	.069203	.013003	-.025305	.051311
4	.021026	-.01766	.059712	.01625	-.023839	.056339
5	.024272	-.010612	.059156	.017313	-.025594	.060219
6	.015833	-.015278	.046943	.00639	-.036808	.049588
7	.004999	-.022253	.032251	.001974	-.038851	.042799
8	.002323	-.022357	.027003	-.001841	-.039833	.036152

VECM Results – Model (iii)

Null Hypothesis	F-Stat.	Prob.	Type of causation
BD does not Granger cause CAD	0.345	0.259	No causality
CAD does not Granger cause BD	1.37	0.026	
RER does not Granger cause CAD	1.06	0.81	No causality
CAD does not Granger cause RER	1.4	0.25	
INF does not Granger cause CAD	0.013	0.443	No causality
CAD does not Granger cause INF	0.298	0.381	
GINDEX does not Granger cause CAD	4.877	0.125	Unidirectional causality from GINDEX to CAD
CAD does not Granger cause GINDEX	0.014	0.906	
GDPG does not Granger cause CAD	6.057	0.335	Bi-directional causality Between CAD and GDPG
CAD does not Granger cause GDPG	4.446	0.13	
ECT_{t-1}	-0.16	0.05	

Granger Causality Test Results – Model (iii)

Null Hypothesis	F-Stat.	Prob.	Type of causation
BD does not Granger cause CAD	1.345	0.259	Unidirectional causality from CAD to BD
CAD does not Granger cause BD	5.77	0.026	
RER does not Granger cause CAD	0.06	0.81	No causality
CAD does not Granger cause RER	1.4	0.25	
INF does not Granger cause CAD	0.613	0.443	No causality
CAD does not Granger cause INF	0.798	0.381	
GINDEX does not Granger cause CAD	5.877	0.025	Unidirectional causality from GINDEX to CAD
CAD does not Granger cause GINDEX	0.014	0.906	
GDPG does not Granger cause CAD	5.057	0.035	Bi-directional causality Between CAD and GDPG
CAD does not Granger cause GDPG	5.446	0.03	

*** Reverse Long Run Causality running from Current Account Deficit to Budget Deficit**

- ❑ Although, the Ricardian Equivalence Hypothesis does not hold in the context of Bangladesh, there is no statistical evidence regarding the Twin Deficits Hypothesis to be holding true.
 - This could be due to the invalidity of the Feldstein-Horioka Puzzle following **lack of capital mobility** within the country.

- ❑ The unidirectional **reverse causality** running from current account deficit to budget deficit implies that rising imbalances in the current account can hinder the simultaneous budget consolidation efforts of the government.
 - Thus, public policies should ideally be directed at curbing the deficits separately, keeping the trade-off between current account deficit minimization and budget deficit aggravation to the minimum

- ❑ Although the budget deficit in Bangladesh hasn't exhibited much fluctuations, but policies must be designed to reduce the fiscal shortfalls further.
 - ❑ **Mobilization of domestic revenue** thus becomes an utmost important public agenda whereby enhancing **tax revenue** volumes should be given key priority.

- ❑ The recent current account deficit issue of Bangladesh can largely be attributed to its narrow export-basket .
 - ❑ **Tourism development** could be an ideal export diversification measure
 - ❑ Attraction of **foreign investments**, particularly in terms of **FDIs**, can play a role in off-setting the dismal state of net exports in Bangladesh (referring to the regression results)

- ❑ Adji, Artidiatun, and James Alm. "Testing for Ricardian equivalence in Indonesia." *Journal of Contemporary Economic and Business Issues* 3, no. 1 (2016): 5-31.
- ❑ Barro, R.J., 1974. Are government bonds net wealth?. *Journal of political economy*, 82(6), pp.1095-1117.
- ❑ Feldstein, M. and Horioka, C.Y, 1980. Domestic Saving and International Capital Flows. *The Economic Journal*, 90(358), pp.314-329.
- ❑ Halicioglu, Ferda, and Kasim Eren. "Testing Twin Deficits and Saving-Investment Nexus in Turkey." (2017). Perelman, S. and Pestieau, P., 1993. *The determinants of the Ricardian equivalence in the OECD countries* (No. 1058). Université catholique de Louvain, Center for Operations Research and Econometrics (CORE).
- ❑ Bangladesh Economic Review. Ministry of Finance, Government of the People's Republic of Bangladesh (2005, 2010, 2016).



THANK YOU