Empirical analysis of Twin deficit hypothesis, Ricardian Equivalence and Feldstein-Horioka puzzle in India

Suraj Badaik

and

Prasant Kumar Panda

Associate Professor ,

Department of Economics

Central University Tamil Nadu, India

Email: prasantkumar@cutn.ac.in

SCHEME OF PRESENTATION

1. Why to analyze twin deficits?
2. Theoretical perspective and importance of Ricardian equivalence and Feldstein- Horioka Puzzle in the context of twin deficit analysis
3. Specific Objectives of the Study
4. Empirical Framework of the study- Data,Model specification and Estimation techniques
5. Empirical Results and observations
6. Conclusion and suggestions

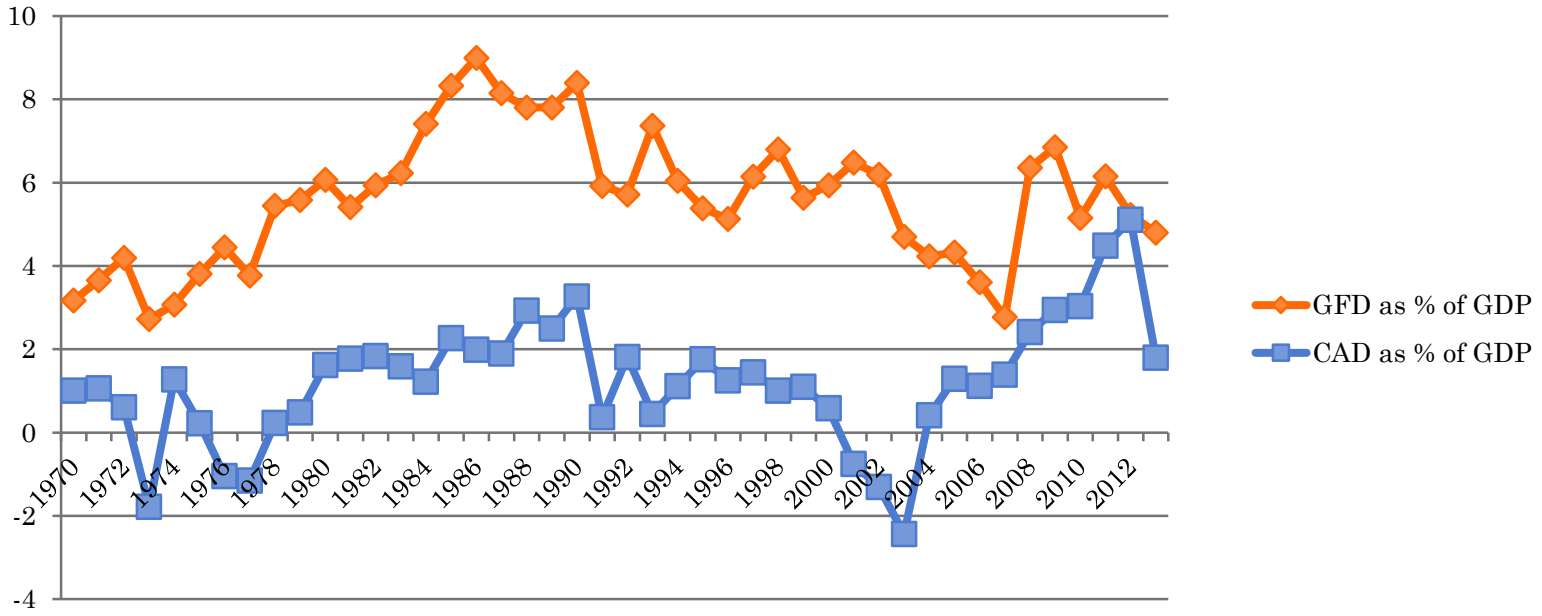
Why to Analyse Twin deficits ?

- The analysis of **relationship between the Budget deficit and current account deficit** in the literature is referred to as twin deficit hypothesis
- The dynamics of current account plays a very important role to maintain Balance of Payment in an economy. Excess CAD will lead to outflow of money from the economy and it will create stress on foreign exchange reserve, internal liquidity, economic growth and has other macroeconomic implications. **It is important to identify key factors Determining CAD and Influence of Fiscal deficit**
- **Theory suggests possible relationship of BD and CAD**

Why to Analyse Twin deficits ?

- The CAD and FD both are deteriorating for India in last few decades or so baring few exceptions . Possibly a long run causal relation between FD and CAD may exist.

Pattern of twin deficit in India



- Current account deficit and Gross fiscal deficit depicts some pattern (1973,to 1992) but not for whole period

Why to Analyse Twin deficits ?

- **Findings in literature on twin deficit validation are divided**. There are mixed results, that gives rise a scope for verification of this issue
- **According to the changes in the relationship between the FD and CAD, policy recommendations for the economy also change**. In a situation of the presence of the twin deficit, the appropriate policy recommendations would be to reduce the FD by an increase in private tax (Marinheiro, 2008).

THEORETICAL PERSPECTIVE AND EMPIRICAL LITERATURE

- Mundel-Fleming model

Budget deficit→ ↑ interest rate → ↑ capital inflow →↑ demand for domestic currency → appreciation of exchange rate →↑ imports ↓exports → CAD (Kouassi, Mougoue, & Kymn, 2004)

- Ricardian Equivalence Hypothesis (REH) (Barro 1974)- The REH that is proposed by Barro states that the public can forecast the future increase in private taxes and reduction in their disposable income. Hence, they cut their consumption expenditure and increase savings for the smooth running of the expected reduction in disposable income. Thus, according to the REH there will not be any rise in investments and CAD in response to BD. **Impact of BD on consumption and CAD would be nil**

Theoretical Literature…

- Feldstein and Horioka Puzzle
- According to Feldstein and Horioka (1980) in a perfect capital mobile world, the quantity of domestic saving may not be that significant in influencing the financing of investment at domestic level. In other words, if savings and investments are not correlated and there will be high capital mobility then, the BD and CAD will move together.

Review of literature

The importance of relationship between fiscal deficit and current account deficit is analyzed from time to time and findings sometimes diverge:

- Zengin (2001), Fidrmuc (2003), Salvatore (2006), Corseti and Muller (2007), Baharumshah and Lau (2007, 2009), Constantinos and Emmanouil (2011), Bagheri, Keshtkaran and Hazrati (2012), Makin and Narayan (2012) found positive causal relation between budget deficit and the current account deficit.
- There was systematic relationship between the budget deficit and the current account deficit.

R..L…Continued……

- Whereas, Enders and Lee (1990), Kaufman, Scharler and Winckler (2002), Kim and Roubini (2007) and Corseti and Muller (2008) found no systematic relationship between the budget deficit and the current account deficit.
- **In the Indian context literature suggests mixed findings**
- **Parikh and Rao (2006) found strong short run and long run relationship between the twin deficits. In contrary, Koussi et al. (2004) and Basu and Datta (2005) invalidated the twin deficit hypothesis in case of India. Anorou and Ramchander(1998) and Jha(2011) observed reverse causation runs from Trade deficit to BD.**

Objectives of the study

- To verify twin deficit hypothesis in Indian context using time series data.

- To observe the Ricardian Equivalence hypothesis and Feldstein-Horioka Puzzle in Indian context to supplement to analysis of twin deficit hypothesis and for appropriate policy options.

METHODOLOGICAL FRAMEWORK OF THE STUDY

- Annual time series data for the period 1970-71 to 2012-13 have been used .
- Data have been taken from secondary sources like Reserve Bank of India., World Bank and International Monetary fund.
- Time series properties like stationarity of variables have been verified using ADF Unit Root test

Model specification and Estimation techniques

Depending on stationary properties, we have used Johansen Cointegration technique for Ricardian Equivalence hypothesis and Twin Deficit hypothesis and ARDL bound test for verifying Feldstein-Horioka Puzzle in our estimation

- Ricardian Equivalence

$$C_t = \lambda_0 + \lambda_1 GC + \lambda_2 GFD + \lambda_3 INC + \lambda_4 TR + \lambda_5 W + \varepsilon_t$$

- Twin Deficit

$$\Delta CAD_t = \alpha_1 + \beta_{11}\Delta CAD_t + \gamma_{12}\Delta GFD_t + \varepsilon_t$$

- Feldstein-Horioka Puzzle

$$CAD = \gamma_0 + \gamma_1 GFD + \gamma_2 INV + \varepsilon_t$$

Empirical analysis
Augmented-Dickey Fuller test of unit root

Variable	Levels			First differences		
	Number of lags	ADF T-test	5% critical value	Number of lags	ADF T-test	5% critical value
Log of real per capita values						
Private consumption	0	2.94	-2.93	0	-4.46*	-2.93
Government consumption	5	0.21	-2.94	4	-3.89*	-2.94
Gross fiscal deficit	0	-1.30	-2.93	1	-6.36*	-2.93
Income	1	1.60	-2.93	0	-4.28*	-3.60
Tax revenue	0	0.98	-2.93	0	-6.23*	-2.93
Wealth	0	-0.76	-2.93	0	-19.01*	-2.93
GDP Ratios						
Current account deficit	0	-2.57	-2.93	1	-6.59*	-2.93
Government expenditure	4	-2.53	-2.93	4	-3.50*	-2.93
Gross Fiscal Deficit	0	-2.91	-2.93	0	-7.92*	-2.93
Trade Deficit	0	-1.92	-2.93	0	-5.03*	-2.93
Investment	0	-3.84*	-2.93	_	_	
Logarithmic conversion						
Real Private consumption	0	2.69	-2.93	0	-4.70*	-2.93
Real exchange	1	-1.09	-2.93	0	-20.86*	-2.93

Ricardian Equivalence Johansen Cointegration test

- $C_t = \lambda_0 + \lambda_1 GC + \lambda_2 GFD + \lambda_3 INC + \lambda_4 TR + \lambda_5 W + \varepsilon_t$

Eigen value	Trace value			Max-Eigen value		
	H_0	Trace	5% critical value	H_0	Max-Eigen	5% critical value
0.9012	None *	200.65	95.75	None *	94.92	40.07
0.6943	At most 1*	105.73	69.81	At most 1*	48.59	33.87
0.5230	At most 2*	57.13	47.85	At most 2*	30.35	27.58
0.3592	At most 3	26.78	29.79	At most 3	18.24	21.13
0.1651	At most 4	8.53	15.49	At most 4	7.39	14.26
0.2730	At most 5	1.13	3.84	At most 5	1.13	3.84

- Trace test and Max-Eigen value test indicates 3 cointegrating equations at 0.05 level
- *denotes rejection of the hypothesis at the 0.5 level
- **Mackinnon-Haug-Mchels (1999) P-values.

Source: computed by author using basic data from Reserve Bank of India, World Bank and International Monetary fund.

RESTRICTIONS ON THE LONG-RUN COEFFICIENTS

	GC	GFD	INC	TR	W	Restriction	LR Test
Basic regression	0.077	-0.035	0.228	-0.090	0.040	___	___
REH regression	-10.058	___	-15.397	-2.517	13.802	GFD= 0	1.46 (0.22)

- Notes: p-values are in parenthesis. GC: government consumption; GFD: gross fiscal deficit; INC: GDP; TR: direct tax; W: wealth.
- Source: computed by author using basic data from Reserve Bank of India, World Bank and International Monetary fund.

➢ **It is evident from the table that the REH is validated.**

Twin Deficit

Johansen Cointegration test for twin deficit variables

Eigen value		Trace		Max Eigen	
	H_0	Trace statistics	5 % critical value	Max-eigen statistics	5 % critical value
0.142	None	10.86	15.49	6.44	14.2
0.099	At most 1*	4.41	3.84	4.41	3.84

- Trace test and Max-Eigen value test indicates cointegrating equations at 0.05 level
- *denotes rejection of the hypothesis at the 0.5 level
- **Mackinnon-Haug-Mchels (1999) P-values.
- Source: computed by author using basic data from Reserve Bank of India, World Bank and International Monetary fund.

VAR CAUSALITY FOR TWIN DEFICIT HYPOTHESIS

Dependent	Constant	ΔCAD_{t-1}	ΔGFD_{t-1}	R^2	F test	
					CAD	GFD
ΔCAD	-0.196	-0.082	-0.014	0.099	1.394 (0.259)	---
ΔGFD	0.156	-0.304	-0.150	0.153	----	2.297 (0.093)

- Notes: P-values are in parenthesis.
- Source: computed by author using basic data from Reserve Bank of India.

Feldstein-Horioka Puzzle (FHP)

- $CAD = \gamma_0 + \gamma_1 GFD + \gamma_2 INV + \varepsilon_t$

Wald test for long run association

Method	Constant	GFD	INV	F Statistics
ARDL (bound test)	1.407	0.189	-4.23	1.055

- Notes: Restrictions are linear in coefficients.
- Source: computed by author using basic data from Reserve Bank of India and International Monetary fund.

Findings and Observations

- The empirical findings suggest the **rejection of the twin deficit hypothesis and the Feldstein-Horioka puzzle in case of India.** The state of high international capital mobility to India is rejected. It is also obvious because half of our study periods cover the time period before the introduction of reforms of 1991 and opening up economy.
- However, it **validates the Ricardian equivalence hypothesis** i.e the fiscal deficit does not affect the current account deficit.
- Validation REH suggests that gross fiscal deficit remains ineffective in influencing percapita private consumption, as the public fully offsets the effects of government's choices of increase in tax for financing expenditures through spending from savings.

FINDINGS AND SUGGESTIONS CONTINUE….

- The effect of increase in tax for swapping of debt on private consumption is nil, according to REH.
- Policy of increasing tax will help government for fiscal consolidation and reducing deficits, but it would be ineffective in controlling current account deficit as twin deficit hypothesis has been rejected in Indian context.
- Addressing structural issues and reforms, and initiatives for domestic productivity and export promotion, competitiveness will help directly target on reduction of CAD in India.

Suggestions to improve the work are welcome
thank you