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Abstract: The purpose of the study is to examine the impact of economic openness on government size in India, using trade openness and capital openness as indicators of economic openness and net fiscal deficit and current account deficit as control variables. ARDL and NARDL bound test approach was employed by taking annual time series data from 1981 to 2020. The estimates confirm a significant long-run and short-run relationship between dependent variables, i.e., government size and independent variables such as trade and capital openness. Empirical results show that in India, an increase in trade openness influences government size positively whereas capital openness affects government size negatively. These findings are crucial for policymakers and regulatory agencies to frame policies that promote economic openness without jeopardising the balance of other macroeconomic variables. Indian policymakers must carefully frame liberal policies to promote trade and capital openness.

Keywords: autoregressive distributed lag; ARDL; NARDL; economic openness; government size; fiscal deficit; current account deficit; CAD; India.

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1 Introduction

Economic openness is considered to be beneficial for economic growth in developed as well as developing countries (Coetzee and Kleynhans, 2017; Dash and Parida, 2012). A country can achieve economic openness when its policies promote and enable the free flow of capital and goods across borders (Alotaibi and Mishra, 2014). Economic openness leads to higher market access, increased competition, innovation, and technology (Abdelhadi et al., 2019; Jin et al., 2019; Mchani and Phiri, 2020). As part of economic openness, capital openness (CO) leads to more exchange of capital, and trade openness (TO) leads to increased productivity of capital which stimulates employment and real wages (Awolusi et al., 2017; Guru and Yadav, 2019; Ilorah and Ngwakwe, 2021; Makris and Stavroyiannis, 2019). Open economies foster innovation and technology, which boosts entrepreneurship in competitive marketplaces and expands market access, which leads to sustainable growth (Eid, 2020; Jani et al., 2019; Karedla et al., 2021; Malefane, 2021; Ngepah and Udeagha, 2019; Ngepah, 2014; Takkar and Sharma, 2021).

Rodrik (1998) proposed two hypotheses relating to economic openness and government size (GS). The 'compensation hypothesis', which is related to TO, states that in open economies, government spending is higher to mitigate against the jeopardy of being exposed to global markets and economic shocks. The 'efficiency hypothesis' holds that CO leads to increased capital mobility from the domestic to international markets thereby reducing the government's tax collection and its ability to sustain high public expenditure. Moreover, higher reliance on external capital may create excessive external debt, domestic inflation, and an increase in government debt repayment expenditure (Bhat and Sharma, 2020; Demikha et al., 2021; Dey and Tareque, 2020; Ozgur et al., 2019; Ramady and Kantarelis, 2009).

The market size of the economy is determined by the amount of economic activity, according to classical economists like Adam Smith (Alesina and Wacziarg, 1998). The developing countries like India that remained closed prior to the 1990s reforms had experienced lower levels of productivity (Panagariya and Sundaram, 2013). These developing economies have a stronger incentive to remain open since economic openness allows to have access to the larger markets. The positive spillovers from developed economies assist developing nations to move from a 'low' equilibrium (because of constant returns on capital and technology) to a 'higher' equilibrium by boosting industrial production (because of increasing returns to the capital and technology) (Alesina and Wacziarg, 1998; Murphy et al., 1989). The role of trade and commerce has changed drastically since India's economy opened up in the 1990s. India is projected to be one of the most contributing to international trade, with a larger export-import-based commercial services industry (World Trade Organization, 2021). This study is motivated to check the impact of liberal trade policies of India on its GS which is measured in terms of government expenditure[1] (Benarroch and Pandey, 2012; Liberati, 2007; Nyasha and Odhiambo, 2021; Rodrik, 1998). In the 1990s with the objective of economic growth, India opened its economy by implementing a liberal exchange rate system (on March 1, 1992), the export-import policy (in the year 1992), and subsequent Foreign Trade policies (FTPs) (Hye and Lau, 2014). The government's FTP for 2015–2020 and 2021–2026 lays out a clear policy aims to increase trade in goods and services by creating a stable and sustainable policy environment that encourages foreign trade in goods and services. Procedures and incentives of exports and imports are part of other initiatives, such 'Make in India', 'Digital India', and 'Skills India'.' As a result, India will be able to improve its global competitiveness and build architecture for its global trade involvement with the goal of increasing markets and improving integration (Government of India, 2021). India's public expenditure has shown an increasing trend post-1990s due to reforms (of globalisation and privatisation) and expansionary policies (Rani and Kumar, 2022). These changes highlight the importance of conducting a thorough research of the relationship between economic openness and the size of government. Indian policymakers are attempting to achieve a balance between global prominence and domestic economic challenges. Furthermore, for developing countries like India, implementing liberal policies to increase economic openness is worrisome because an overly liberalised approach may have adverse consequences for other macroeconomic variables such as fiscal and current account balances.

In this study, we look into Rodrik (1998) two hypotheses in the context of India and the magnitude of the impact of liberal approach on variables like government expenditure (GS) in presence of control variables like fiscal deficit and current account deficit (CAD) using auto-regressive distributed lag model. The paper is structured according to the following sections. Section 2 discusses the theoretical framework of relation between GS with trade and capital balance followed by literature review. Section 3 describes the data and the methodology. Section 5 deals with the empirical results whereas Section 6 addresses the study's conclusion, policy implications, and future scope of research.

2 Theoretical framework and literature review

Discussion in the literature on economic openness and size of government is divided between the conventional hypothesis of efficiency and compensation proposed by Rodrik (1998). According to the efficiency hypothesis, governments are too small (in international contexts) and have a limited source of revenue (under fiscal federalism) to pay increased public spending, resulting in a drop in public revenue due to tax revenue mobility (Liberati, 2007). This means that governments collect fewer taxes to maintain global competitiveness on foreign capital and have fewer revenue resources to finance their deficit budgets in response to CO (Liberati, 2007). However, according to the compensation hypothesis (Rodrik, 1998) with regard to TO suggest that governments have to spend more on the public sector to compensate against the external risk that arises due to open economy (Schulze and Ursprung, 1999). The studies like Bernauer and Achini (2000), Garrett and Mitchell (2001), Adserà and Boix (2002), Avelino et al. (2005), Balle and Vaidya (2002), Dixit (2014), and Shelton (2007) among others supported the compensation hypothesis. On the other hand, studies like Borcherding et al. (2005), Ferris (2003), Figlio and Blonigen (2000), Garrett and Mitchell (2001), Liberati (2007), Nguea (2020), Rodrik (1998) among others supported the efficiency hypothesis.

Empirical studies such as Cameron (1978) and Rodrik (1998) discovered a positive association between TO and GS, concluding that more government expenditure protects the domestic economy from external risk. According to De Mendonça and De Oliveira (2019), TO promotes developing countries to boost their expenditure, while no evidence has been found in developed countries (see also Epifani and Gancia, 2009; Lin et al., 2014; De Mendonça and Cacicedo, 2015; Ram, 2009). However, the correlation between TO and the size of the government was not found robust by studies like Benarroch and Pandey (2008, 2012). These studies have used TO as a measure of economic openess to investigate an association between economic openness and the size of the government.

With the growth of global capital markets and the implementation of more liberalised capital mobility policies, it is more necessary than ever to consider CO alongside TO as a measure of economic openness. As a result, the capital market and its growth are critical in assessing the influence of CO on GS. Kimakova (2009) found a positive association between CO and size of the government in developing economics and a negative relationship between CO and GS in financially developed economics. The CO and size of the government are negatively related as CO causes high tax mobility and reduces the ability of the government to spend more (Kimakova, 2009; Liberati, 2007; De Mendonça and De Oliveira, 2019). According to the literature, openness of the economy causes policy and fiscal pressure in the form of reduced government revenue on the one hand, and increased government expenditure, on the other hand, to safeguard and cushion its domestic sector against external risk (Nguea, 2020). Some studies found a positive relationship between economic openness and government expenditures (De Mendonça and De Oliveira, 2019) while studies by Kaufman and Segura-Ubiergo (2001), Busemeyer (2009), Meinhard and Potrafke (2012) found a negative relationship between economic openness and government spending.

According to Islam (2004), the size of governments may not be altered to mitigate the external risk which arises due to openness. There is no evidence to prove a robust causal relationship between countries' openness and GS (Molana et al., 2004). An opposite view from what Rodrik (1998) proposed was observed by Garen and Trask (2005), they observed that more restrictive countries have higher government spending due to economic stabilisation expenditures like price controls, social protection policy, barriers, etc. However, Phiri (2017) suggested that excessive expenditure is not a cure for overcoming the macroeconomic repercussions of the global recession. Empirical studies like Benarroch and Pandey (2008), Iversen and Cusack (2000), and Kittel and Winner (2005) did not find any association between the size of government, TO and CO. Most of the studies in Indian context have empirical examined the impact of economic growth on GS and have found mixed results (see Chatterji et al., 2014; Hye and Lau, 2014; Karras, 2003; Kumari et al., 2021; Mallick, 2008). There are very few studies which measure the relationship between economic openness and GS. The studies like Benarroch and Pandey (2008), found no evidence to support the compensation and efficiency hypothesis in Indian economy whereas, Dixit (2014) investigated the impact of economic openness on GS. Study used autoregressive distributed lag (ARDL) model by taking GS as dependent variable and TO and capital financial openness as independent variable. The author found evidences to favour efficiency hypothesis but no evidence to support compensation hypothesis. Thus, limited studies and mixed results in Indian context makes difficult to know the impact of trade and CO on GS. Based on a brief review of the literature, there appears to be no conclusive evidence about the relationship between trade and CO and their impact on GS. The majority of empirical research into the relationship between trade and CO and GS has yielded mixed results; potentially related to sample size, study time period, methodology, economic openness proxy variables, and GS. Furthermore, most studies have missed out on including factors like fiscal deficit and CAD to reflect the influence of expansionary fiscal policy (greater expenditure) and liberal international trade policy to achieve economic openness, as evidenced by the review of literature. As a result, both the efficiency hypothesis and the compensation hypothesis must be validated in order to assess the true influence of these two opposing factors (TO and financial openness) on GS. If CO is linked to a smaller government, the efficiency hypothesis holds true; but, if TO is linked to an increase in government spending, the compensation hypothesis remains true.

3 Methodology

The saving-investment identity and the national income identity are used to determine the relationship between economic openness and GS.

$$Y = C + I + G + (X - M) \tag{1}$$

where Y = GDP, C = consumption, I = investment, G = government expenditures and $(X - M)$ = net exports (goods and capital); the above national income identity can be rewritten by using the 'after tax (T) income equals consumption plus savings (S)' relationship.

$$S + (T - G) - I + (X - M) \tag{2}$$

Further, the above expression can be rearranged into three identities $(S - I)$, $(X - M)$, and $(T - G)$.

$$(X - M) = (S - I) + (T - G) \tag{3}$$

From the above equation, it can be seen that the balance of the current account ($CA = (X - M)$) can influence the budget balance ($FD = (T - G)$) and vice versa. The policies promoting TO will impact the economy's ability to export and its imports, which can subsequently alter the current account balance. Moreover, the budget balance ($FD = (T - G)$), depends upon the government's capacity to spend and earn revenue, so governments' decision to spend more to compensate the domestic sector against the external risk (as proposed in the compensation hypothesis) or its decision to liberalised tax policy to promote CO (as proposed in the efficiency hypothesis) will impact its budget balance. From equation (3), we can infer that the government's policies related to economic openness will have an impact on its current account and budget balances. Hence, the GS is a function of TO, CO, net fiscal deficit (NFD), and CAD.

3.1 Data and variables

Data of GS, TO, CO, NFD, and CAD are taken from *RBI Handbook of Statistics-2019*, 2020 and previous issues (RBI, 2020) during the period from 1981 to 2020. The nominal variables are deflated into real ones by the GDP deflator (2004–2005 constant price). To determine the size of the government, the dependent variable is government expenditure as a percentage of GDP (GS). The compensation hypothesis depicts open economies spending more to insure the domestic sector against the volatility due to economic openness and exposure to international markets (see Benarroch and Pandey, 2012; Dixit, 2014; Islam, 2004; Liberati, 2007; Molana et al., 2004; Nguea, 2020). The standard measure of TO, i.e., the sum of exports and imports as a percentage of GDP is used to estimate the proportion of trade compared to domestic production of goods and services (Dixit, 2014; Islam, 2004; Liberati, 2007; Molana et al., 2004; Nguea, 2020). Total foreign investment (inflow and outflow) as a percentage of GDP is taken as a measure of CO (Dixit, 2014; Islam, 2004; Liberati, 2007; Molana et al., 2004; Nguea, 2020). Whereas, NFD and CAD as a percentage of GDP are taken as control variables to measure the impact on the fiscal as well as current account balances (Avelino et al., 2005; De Mendonça and De Oliveira, 2019; Rodrik, 1998).

3.2 Model

The objective of the study is to check the relationship between GS and economic openness and in presence of control variables like fiscal deficit and CAD. For the study, we employed the ARDL bounds testing (Pesaran et al., 2001) and nonlinear ARDL (Shin et al., 2014) approach. Hence, equation (4) represents the ARDL long-run equation of GS as a function of all the explanatory variables under study.

$$GS_t = \alpha_0 + \alpha_1 TO_t + \alpha_2 CO_t + \alpha_3 NFD_t + \alpha_4 CAD_t + \varepsilon_t \tag{4}$$

where GS_t is 'GS', TO_t is 'TO', CO_t is 'CO', NFD_t is 'NFD', CAD_t is 'CAD', t and ε shows 'the time period and error term'.

The advantages of using the ARDL approach over other co-integration techniques are fourfold. To begin, the variables under investigation can be stationary just at I (0), I (1), or a combination of both (Acquah, 2010). Second, the approach's effectiveness with a smaller sample size. Third, it shows the long-run and short-run relationships separately. Finally, because economic time series frequently have structural breaks due to changes in the economic, political, and international environment, this technique aids in reporting the structural breaks in the equation (Patel and Patel, 2022). We estimate the ARDL bounds test formulated for GS as follows in equation (5) to explore the cointegration among the variables specified in equation (4).

$$\begin{aligned}\Delta GS_t &= \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GS_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta TO_{t-i} + \sum_{i=1}^{n} \alpha_{3i} \Delta CO_{t-i} \\ &+ \sum_{i=1}^{n} \alpha_{4i} \Delta NFD_{t-i} + \sum_{i=1}^{n} \alpha_{5i} \Delta CAD_{t-i} + \beta_1 GS_{t-1} + \beta_2 TO_{t-1} \\ &+ \beta_3 CO_{t-1} + \beta_4 NFD_{t-1} + \beta_5 CAD_{t-1} + \varepsilon_t\end{aligned} \tag{5}$$

Here Δ represents the first difference operator; α_1 …… α_5 and β_1 ….. β_5 represent coefficients of the ARDL model in the short-run and long run coefficients respectively; *i*, *n* represents optimal and threshold lag respectively; ε_t represents the white noise terms.

The computed long-run coefficients in equation (5) are used to test the existence of cointegration. To test the hypothesis, the null hypothesis is that the variables have no long-term relationship $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$, whereas the alternate hypothesis is that the variables are cointegrated $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 = 0$. The Wald F-test is used to verify this, and F statistics, as well as upper and lower bound critical values, are obtained. If the F statistic found is above the upper bound critical values, the null hypothesis is rejected; if the F statistic is below the lower bound critical values, the null hypothesis is not rejected. The existence of a long-term relationship is regarded as inconclusive if the F-statistics is between the upper and lower bound values. Once the cointegration has been established, error correction model must be used to represent the rate of adjustment to the long-run equilibrium, as shown below:

$$\begin{aligned}\Delta GS_t &= \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GS_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta TO_{t-i} + \sum_{i=1}^{n} \alpha_{3i} \Delta CO_{t-i} \\ &+ \sum_{i=1}^{n} \alpha_{4i} \Delta NFD_{t-i} + \sum_{i=1}^{n} \alpha_{5i} \Delta CAD_{t-i} + ECT_{t-1} + \varepsilon_t\end{aligned} \tag{6}$$

The ARDL establish only linear relationship. Hence, we further estimate the NARDL model (Shin et al., 2014) to capture the long-run and short-run asymmetric relationship of TO on the GS in the presence of other explanatory variables specified in equation (4).

$$GS_t = \alpha_0 + \alpha_1^{+} TO_t + \alpha_2^{-} TO_t + \alpha_3 CO_t + \alpha_4 NFD_t + \alpha_5 CAD_t + \varepsilon_t \tag{7}$$

Equation (7) is the NARDL edition of equation (4) that divided the TO into two categories: positive and negative effects of TO on GS. Here, our parameters are $\alpha_0, \alpha_1^{+}, \alpha_2^{-}, \alpha_3, \alpha_4, \alpha_5$ and $TO_t = TO_0 + TO_t^{+} + TO_t^{-}$ are the vector of unknown LR parameters. Where $TO_t^{+} + TO_t^{-}$ signify the 'partial sum of positive and negative variation' in TO_t, respectively.

$$TO_t^{+} = \sum_{j=i}^{t} \Delta TO_t^{+} = \sum_{j=i}^{t} Max\left(\Delta TO_j, 0\right) \Big| TO_t^{-} = \sum_{j=i}^{t} \Delta TO_t^{-} = \sum_{j=i}^{t} Min\left(\Delta TO_j, 0\right) \tag{8}$$

where of ΔTO_t^{+} and ΔTO_t^{-} are computed as positive and negative shocks of TO. By pursuing the approach of Shin et al. (2014), the following equation represents a nonlinear ARDL model that incorporates the short-run and long-run asymmetric relationship between GS and TO in the presence of other explanatory variables:

$$\begin{aligned}\Delta GS_t &= \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GS_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta TO_{t-1}^{+} + \sum_{i=1}^{n} \alpha_{3i} \Delta TO_{t-1}^{-} \\ &+ \sum_{i=1}^{n} \alpha_{4i} \Delta CO_{t-i} + \sum_{i=1}^{n} \alpha_{5i} \Delta NFD_{t-i} + \sum_{i=1}^{n} \alpha_{6i} \Delta CAD_{t-i} \\ &+ \beta_1 GS_{t-1} + \beta_2 TO_{t-1}^{+} + \beta_3 TO_{t-1}^{-} + \beta_4 CO_{t-1} + \beta_5 NFD_{t-1} + \beta_6 CAD_{t-1} + \varepsilon_t\end{aligned} \tag{9}$$

where n denotes optimal lag order and $\sum_{i=1}^{n} \alpha_{1i}$ to $\sum_{i=1}^{n} \alpha_{6i}$ denotes the short-run relationship of explanatory variables with positive and negative shocks of TO on GS. Whereas, β_1 to β_6 measure the long-run relationship of the same. After estimating equation (9), we used Wald test to investigate both short run and long run asymmetries. Now, the restricted error correction model for NARDL is proposed as follows;

$$\begin{aligned}\Delta GS &= \sum_{i=1}^{n} \delta_{1i} \Delta GS_{t-i} + \sum_{i=1}^{n} \left(\delta_{2i}^{+} TO_{t-1}^{+} + \delta_{2i}^{-} TO_{t-1}^{-} \right) + \sum_{i=1}^{n} \delta_{3i} \Delta CO_{t-i} \\ &+ \sum_{i=1}^{n} \delta_{4i} \Delta NFD_{t-i} + \sum_{i=1}^{n} \delta_{5i} \Delta CAD_{t-i} + ECT_{t-1} + \varepsilon_t\end{aligned} \tag{10}$$

where δ_{1i}, δ_{3i}, δ_{4i} and δ_{5i} are the short-run coefficients, whereas $\delta_{2i}^{+}, \delta_{2i}^{-}$ denotes the positive and negative shocks of TO.

4 Results and discussion

To understand the basic characteristics of the data, the descriptive statistics of each variable are presented in Table 1. The average GS between 1981 and 2020 is 47.69%, whereas the average TO and CO between 1981 and 2020 is 23.26% and 1.50%, respectively. On the basis of standard deviation, it is clear that TO have the highest volatility, whereas NFD has the lowest. The Jarque-Bera statistics suggest that all the variables except the CAD are normally distributed. The correlation between GS and TO (0.410) as well as GS and CO (0.610) gives primal evidence of the relation between economic openness and the size of the government (see Dixit, 2014; Liberati, 2007). Hence, ARDL bound test is employed to examine the magnitude and direction of the relationship between GS and economic openness.

To avoid spurious results, the primary constraint of ARDL and NARDL require that the series should not be integrated at the order I(2). The ADF and PP are used to check the stationarity of the series. Table 2 shows the results of the unit root test.

The unit root test estimates are measured at a level and first difference series. The results of ADF and PP confirms the stationary at I(1). We have established the order of integration only when both the unit root tests confirm the results at a 1% level of significance. Further, the results of unit root tests confirm that none of the series is I(2), which satisfies the first condition of ARDL and NARDL.

ARDL and NARDL bounds test estimates are presented in Table 3. The estimated F-statistics for ARDL and NARDL surpasses 99% upper bound, which indicates the null of no cointegration cannot be accepted which indicates that the linear and nonlinear cointegration survives. F-statistics indicates the long-run cointegration between the size of the government (GS) and economic openness (TO and CO). Table 4 presents the estimates of long-run and short-run coefficients of ARDL and NARDL co-integrating equation [equation (4), equation (6) and equation (7), equation (10)] respectively.

Table 1 Descriptive statistics and correlation matrix

	GS	*TO*	*CO*	*CAD*	*NFD*
Mean	47.687	23.261	1.503	1.435	4.227
Median	47.605	21.200	1.500	1.350	4.040
Maximum	59.640	44.400	5.000	4.800	6.350
Minimum	31.770	11.400	0.000	–2.300	2.420
Std. dev.	6.725	10.397	1.356	1.261	0.911
Skewness	–0.388	0.610	0.742	–0.197	0.244
Kurtosis	3.339	2.122	3.023	4.993	2.499
Jarque-Bera	1.196	3.763	3.674	6.882	0.814
Probability	0.550	0.152	0.159	0.032**	0.666
			Correlation matrix		
GS	---				
TO	0.410*	---			
CO	0.610*	0.775*	---		
CAD	–0.306***	0.185	0.06	---	
NFD	0.355**	0.056	0.094	0.238	---

Notes: *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.

Table 2 Results of unit root tests

Variables	*ADF*		*PP*	
	Level form			
	Intercept and trend	*Intercept*	*Intercept and trend*	*Intercept*
Government size	–1.847	–2.847***	–1.358	–2.339
Trade openness	–0.998	–1.083	–1.624	–1.192
Capital openness	–1.042	–1.434	–3.620**	–2.244
Net fiscal deficit	–3.336***	–3.422**	–3.243***	–3.352**
Current account deficit	–2.602	–2.642***	-2.625	–2.665***
	First differenced			
	Intercept and trend	*Intercept*	*Intercept and trend*	*Intercept*
Government size	-4.710*	-3.986*	-4.774*	-4.099*
Trade openness	-4.892*	-4.907*	-4.971*	-4.987*
Capital openness	–12.196*	–12.153*	–12.619*	–12.278*
Net fiscal deficit	–6.327*	–6.179*	–7.427*	–7.417*
Current account deficit	–6.614*	–6.713*	–6.647*	–6.753*

Note: *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.

Table 3 ARDL and NARDL bound test results

	ARDL		NARDL	
F-statistics	*6.677**		*5.342**	
Significance	*Lower bound*	*Upper bound*	*Lower bound*	*Upper bound*
10%	2.2	3.09	2.08	3
5%	2.56	3.49	2.39	3.38
1%	3.29	4.37	3.06	4.15

Note: *indicates 1% statistical significance level.

Table 4 Results of short-run and long-run relationship using ARDL and NARDL model

Variables	*ARDL*	*NARDL*
	Coefficient (Prob.)	*Coefficient (Prob.)*
Short run coefficients		
Δ(GS(-1))	0.24 (0.046**)	0.365 (0.002*)
Δ(TO)	0.088 (0.310)	---
Δ(TO(-1))	–0.24 (0.014**)	---
Δ(TO_NEG)	---	0.378 (0.007*)
Δ(TO_NEG(-1))	---	0.304 (0.032**)
Δ(TO_NEG(-2))	---	0.661 (0.001*)
Δ(TO_NEG(-3))	---	0.986 (0.000*)
Δ(CO)	0.015 (0.950)	0.097 (0.631)
Δ(CO(-1))	1.381 (0.000*)	1.224 (0.001*)
Δ(CO(-2))	---	0.513 (0.026**)
Δ(CAD)	–0.809 (0.000*)	–0.763 (0.000*)
Δ(CAD(-1))	1.737 (0.000*)	1.914 (0.000*)
Δ(CAD(-2))	---	1.937 (0.000*)
Δ(CAD(-3))	---	1.408 (0.000*)
Δ(NFD)	2.043 (0.000*)	2.257 (0.000*)
Δ(NFD(-1))	–1.879 (0.000*)	–2.011 (0.000*)
Δ(NFD(-2))	---	–1.301 (0.000*)
Δ(NFD(-3))	---	–0.334 (0.137)
ECT(-1)	–0.427 (0.000*)	–0.528 (0.000*)
Long run coefficients		
Trade openness (TO)	0.688 (0.027**)	---
Trade openness (+)	---	0.545 (0.032**)
Trade openness (-)	---	–0.198 (0.649)
Capital openness (CO)	–4.604 (0.099***)	–3.911 (0.067***)
Current account deficit (CAD)	8.879 (0.000*)	7.749 (0.000*)
Net fiscal deficit (NFD)	–7.007 (0.000*)	–5.99 (0.000*)
Constant	11.582 (0.076***)	21.508 (0.000*)

Note: *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.

Table 4 Results of short-run and long-run relationship using ARDL and NARDL model (continued)

Variables	*ARDL*	*NARDL*
	Coefficient (Prob.)	*Coefficient (Prob.)*
Diagnostic tests		
WaldLR asymmetry	---	24.999 (0.0001*)
WaldSR asymmetry	---	6.219 (0.0226**)
R-squared	0.9377	0.9412
Adjusted R-squared	0.8788	0.889
Normality [Jarque-Bera (p-value)]	2.205 (0.332)	0.749 (0.687)
Serial correlation [LM test F-statistic (p-value)]	2.418 (0.135)	1.304 (0.314)
Heteroscedasticity [Breusch-Pagan-Godfrey (p-value)]	0.3771 (0.979)	0.463 (0.943)
Ramsey RESET test [F-statistic (p-value)]	0.4688 (0.507)	1.795 (0.216)

Note: *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.

According to the long-run estimations the GS is significantly affected by economic openness i.e., TO and CO. The TO coefficient is positive and significant, implying that a 1% increase in TO to GDP corresponds to a 0.69% increase in GS (i.e., government expenditure as percentage of GDP). Estimates confirm the compensation hypothesis given by (Rodrik, 1998), which asserts that the government expenditure are high in open economies in order to hedge against the danger of high exposure to the global markets. This relationship is consistent with previous studies on GS and TO (see Bernauer and Achini, 2000; Hicks and Swank, 1992; Rodrik, 1998; Ruggie, 1982; Shelton, 2007; Swank, 2001). The coefficient of CO ($\alpha_2 = -4.604$) is negative and significant, implying that for every percentage rise in CO to GDP, the size of government shrinks by 4.60%. This relationship supports the efficiency hypothesis by Rodrik (1998), which states that more CO leads to higher capital mobility from the domestic market, which affects the government's tax collection and ability to maintain high public expenditure. This is consistent with previous studies on GS and CO (see Cusack, 1997; Dixit, 2014; Figlio and Blonigen, 2000; Grubert, 2000; Liberati, 2007; Nguea, 2020; Rodrik, 1998).

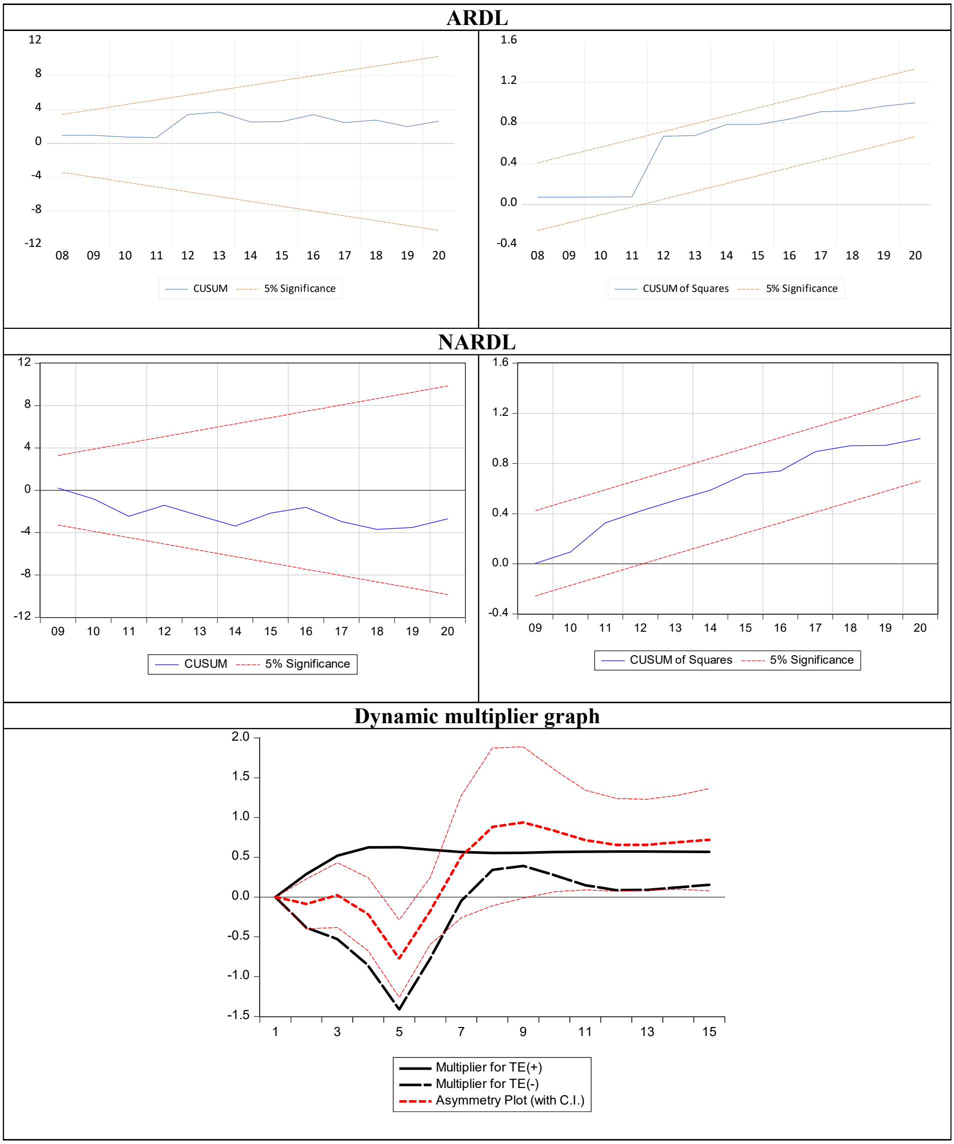
The model includes two control variables; CAD (percent of GDP) and NFD (percent of GDP) with the goal of quantifying the impact of liberal policies on achieving economic openness. The CAD coefficient is positive and significant, implying that for every percent increase in the CAD to GDP, the government spends 8.88% more. This indicates that the size of government spending is proportional to the size of the CAD. The increase in the CAD is attributable to an excess of imports over exports as a result of the liberal trade policy that promotes TO (Ozgur et al., 2019). This supports the compensation hypothesis which states that higher government spending helps to preserve and promote domestic industries in international market through subsidies or incentives for higher production and exports (Rodrik, 1998). The negative and significant coefficient of NFD (percentage of GDP) suggests that for every percent increase in the fiscal deficit, government spending falls by 7%. Liberal taxation policies on capital mobility, according to the efficiency hypothesis (Rodrik, 1998), diminish government revenue and spending capacity.

Table 4 also reports the results of the NARDL estimation indicating the short-run and long-run coefficients. In terms of the asymmetric impact of TO on the GS, the results show that positive shocks in TO leads increase in GS and negative shocks in TO leads increase in GS. Furthermore, every 1% increase in TO leads 0.55% increase in GS, this clearly indicates government supports to the domestic industries to safeguard any shocks due to globalisation which asserts compensation hypothesis in Indian context (see Rodrik, 1998; Shelton, 2007; Swank, 2001). Every 1% reduction in TO results in a 0.20% rise in GS, which is insignificant. When TO shows a downward tendency, the government may not necessarily lower its spending. As a result, the magnitude and direction of causality between negative TO and GS obviously warrants additional investigation using a different measures of TO. The magnitude of positive changes in the TO is higher than negative shocks. Further, the positive change is also statistically significant. The results of other explanatory variables are similar to the ARDL model.

The error correction model is estimated to check the short-run relationship among the variables. Estimates of the short-run model are also presented in Table 4. In the short run, economic openness variables such as TO and CO have a significant impact on GS. Short-run estimates show that changes in GS_{t-1} lagged values have a 0.24% positive impact on GS (see Liberati, 2007; Rodrik, 1998). Similarly, changing the lagged values of CO_{t-1} increases GS_t by 1.38%, whereas changing the lagged values of TO_{t-1} decreases GS_t by 0.24% (see Dixit, 2014). The error correction term in the dynamic model represents the rate of adjustment that restores the equilibrium relationship. The ECM term is negative and statistically significant at 1% for both ARDL and NARDL models, implying a stable long-run relationship between variables (Banerjee et al., 1998). It demonstrates that short-run disequilibrium converges to long-run equilibrium at a speed of 42.7% in the ARDL model and 52.8% in the NARDL model. This suggests that the NARDL model provides a better speed adjustment to long-run relationship equilibrium. The diagnostics of the model is also reported in Table 4.

According to the model diagnostics estimations, both models are found to be consistent. The NARDL model fits in a better form with an R-square of 0.94 and adjusted R-square of 0.89. The results of the Jarque-Bera and LM tests confirm the normally distributed residuals and no serial correlation respectively. The model is well-fitting in Ramsey functional form, and it is free from heteroscedasticity. The stability of Model is checked using CUSUM and CUSUMSQ test and is presented in Figure 1 for both the models. It is apparent that model is stable during structural break and confirms the stability of long-run estimates. To confirm the long-run and short-run asymmetry, we performed the Wald test. The significant Wald test confirms the long-run and short-run asymmetric nexus between GS and TO. Further, the cumulative dynamic multiplier is used to assess the short-and long-run asymmetric influence of TO on GS. It estimates the percentage point change in GS due to one percent positive and negative shocks in TO. It demonstrates that TO and GS have a positive relationship. This finding is consistent with the long-run NARDL relationship. The short-run net effect of TO (thick red-dashed line) is negative whereas the long-run effect is positive.

Figure 1 Plots of CUSUM, CUSUM of squares and dynamic asymmetric multiplier (see online version for colours)



5 Discussion

The analysis revealed that in the Indian economy, both compensation and efficiency hypotheses exist. Our linear and nonlinear estimates show GS elasticity in relation to TO, demonstrating that TO has a positive effect on GS, confirming the compensation hypothesis (Rodrik, 1998) in India. However, the insignificant negative coefficient of TO in NARDL estimates suggest that the government may not necessarily lower its spending.

As a result, the magnitude and direction of causality between negative TO and GS obviously warrants additional investigation using different measures of TO. This indicates that, while India's liberal trade policies would result in increased government spending to safeguard domestic industries from external risk, the countries fiscal and CADs will likely widen. Furthermore, the negative relationship between GS and CO in the Indian context supports the efficiency hypothesis (Dixit, 2014; Rodrik, 1998), implying that India's policy to encourage CO may result in a reduction in GS as a result of the country's liberal taxation policy, which limits the its ability to spend more.

6 Conclusions

The present study explores the long-run and short-run relationship between economic openness and GS. The relationship was checked by estimating the impact of TO and CO (as a measure of economic openness) on GS in presence of NFD and CAD as the control variables. The ARDL and NARDL bound test approach was employed on the annual time-series data from the year 1981 to 2020. We observed that all the series are stationary at I(1) order of integration. Both ARDL and NARDL bound test confirms the existence of a long-run relationship between economic openness and GS (as dependent variable).

The result of long-run estimates shows that the size of government is significantly influenced by TO and CO. The empirical findings imply that increased TO leads to a significant increase in GS. The study also suggests that increased CO leads to a large reduction in GS. The negative long-run relationship between NFD and GS shows that the greater CO may result in lower tax collection as a result of liberal tax policy, limiting governments' ability to spend more. The positive long-run association between current account and GS indicates that greater TO may result in a larger CAD as imports outweigh exports. The negative and significant error correction term suggests that any disequilibrium in long-run adjust at a speed of 42.7% (ARDL) and 52.8% (NARDL).

The ARDL and NARDL bound test estimates are robust and confirm that economic openness impacts the GS in India. The estimates validate both the hypothesis proposed by (Rodrik, 1998) in long-run as well as in short-run. It can be inferred from the study that liberal policy to promote trade and CO should be designed and promoted judiciously, as excessive liberalised approach may impact other macroeconomic variables such as fiscal and current account balances. Integrating domestic market with global markets poises a big challenge for the countries like India who aspires to penetrate into the global markets. Indian policy makers need to balance between global presence and economic challenges faced by domestic sectors. The study's findings suggest that the relationship between economic openness and GS needs further investigation. Firstly, the study results show a statistically insignificant relationship between negative shocks in TO and GS (when a total of exports and imports as a percentage of GDP is used as a measure of TO). This relationship can be explored further by taking TO at a disaggregate level, such as exports/GDP and imports/GDP. Second, the worldwide analysis may be more informative than a country-specific analysis; hence this can be extended by considering a panel of comparable economies. Third, this relationship can be investigated further by taking government spending at a disaggregated level and looking at state government spending to see how economic openness affects public spending at the intermediate and local levels.

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Notes

1 GS represents government expenditure. According to Rodrik (1998) "There is a positive and robust partial correlation between openness, as measured by the share of trade in GDP, and the scope of government, as measured by the share of government expenditure in GDP… Hence, unlike other explanations for the correlation between openness and government size, this one receives consider-able support".

Liberati (2007) "Government size is measured by government expenditure, as compensation hypothesis is in terms of expenditure….. as the validity of the compensation hypothesis, if any, is likely to entail a greater redistributive effort of central governments – where most of the redistributive function is concentrated – the use of CG expenditures is a natural candidate for this test."