RESEARCH ARTICLE

https://doi.org/10.17059/ekon.reg.2023-4-25
JEL Classification: H3, H5, H6, H62, F31, F63
UDC: 336.1:339.5

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Impact of Deficit Financing and Trade Openness on Private Consumption in India[1]

Abstract. The Ricardian equivalence hypothesis claims that private consumption is neutral to the fiscal deficit and its mode of financing (debt vs tax). The study reinvestigates the Ricardian equivalence hypothesis in India by taking private consumption as the dependent variable, whereas government expenditure, government debt, tax, domestic income, and trade are considered as independent variables. In the Indian context, the Ricardian view raises an interesting point. If the Ricardian equivalence holds in the Indian economy, households alter their spending patterns and consequently increase their savings, making the policy changes ineffective. The autoregressive distributed lag (ARDL) bound testing approach was applied to the annual time series data from 1988 to 2021. The estimates confirm a significant long-run and short-run relationship between the variables; the results reject the Ricardian Equivalence and propound the Keynesian approach that the mode of financing the fiscal deficit (debt vs tax) does matter to the private consumption expenditure. The estimates also assert the long-run relation between trade openness and private consumption spending. The positive and significant coefficient shows that an open economy leads to an increase in consumption, which indirectly supports the Compensation Hypothesis. Given that deficit financing and trade openness have a substantial influence on India's consumer spending, it can be concluded that expansionary fiscal and liberal trade policies should be carefully devised and supported. This study contributes to the existing literature on the Ricardian equivalence and trade openness by presenting new evidence on designing sustainable fiscal policy by spending wisely without imperilling the country's consumption expenditure and global presence.

Keywords: ARDL, consumption expenditure, deficit financing, Ricardian equivalence, trade openness, fiscal policy, fiscal deficit, India

For citation: Mehta, D., & Mallikarjun, M. (2023). Impact of Deficit Financing and Trade Openness on Private Consumption in India. *Ekonomika regiona / Economy of regions, 19(4)*, 1293-1305. https://doi.org/10.17059/ekon.reg.2023-4-25

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ИССЛЕДОВАТЕЛЬСКАЯ СТАТЬЯ

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Влияние финансирования дефицита и открытости торговли на личное потребление в Индии

Аннотация. Согласно теории рикардианской эквивалентности, бюджетный дефицит и способ его финансирования (за счет налогов или займов) не оказывают влияния на личное потребление. В данной статье гипотеза рикардианской эквивалентности исследуется на примере Индии. В качестве зависимой переменной выступает личное потребление, тогда как государственные расходы, государственный долг, налоги, внутренний доход и торговля рассматриваются как независимые переменные. Если принять, что рикардианская эквивалентность справедлива для экономики Индии, изменение структуры расходов домохозяйств приведет к увеличению сбережений, снижая эффективность политических мер. Модель авторегрессии и распределенного лага (ARDL) была использована для анализа временных рядов данных с 1988 г. по 2021 г. Проведенный анализ подтвердил значительную долгосрочную и краткосрочную взаимосвязь между переменными; результаты исследования опровергают рикардианскую эквивалентность и поддерживают кейнсианский подход, согласно которому способ финансирования бюджетного дефицита влиет на личные потребительские расходы. Также была выявлена долгосрочная связь между личными потребительскими расходами и открытостью торговли. Положительный и значимый коэффициент указывает на увеличение потребления в открытой экономике, что косвенно подтверждает гипотезу компенсации. Учитывая существенное влияние финансирования дефицита и открытости торговли на потребительские расходы в Индии, можно сделать вывод о необходимости разработки экспансионистской фискальной и либеральной торговой политики. Статья дополняет существующие исследования по теме рикардианской эквивалентности и открытости торговли, предоставляя новые данные о разработке устойчивой фискальной политики с соблюденем принципа разумного расходования средств без ущерба для потребительских расходов и глобального присутствия.

Ключевые слова: модель авторегрессии и распределённого лага, потребительские расходы, финансирование дефицита, рикардианская эквивалентность, открытость торговли, фискальная политика, бюджетный дефицит, Индия

Для цитирования: Мехта, Д., Малликарджун, М. (2023). Влияние финансирования дефицита и открытости торговли на личное потребление в Индии. *Экономика региона, 19(4)*, 1293-1305. https://doi.org/10.17059/ekon.reg.2023-4-25

1. Introduction

The impact of the budget deficit on private consumption is a prevalent issue in macroeconomics (Keho, 2016). There are three distinct views on the impact of deficit financing on private consumption. Keynesian school of thought believes that fiscal deficit and the mode of financing these deficits will impact private consumption (Yellen, 1989). The Ricardian Equivalence hypothesis claims that private consumption is neutral to the fiscal deficit and its financing (Barro, 1976; Evans, 1988). However, neoclassical views state that the deficit's debt financing may crowd out private consumption because of the rise in interest rates (Kormendi, 1983).

The method of financing the deficit and its effects are a matter of debate in the literature on public finance. Some argue that raising domestic government debt through debt financing tends to push interest rates upward. Furthermore, foreign debt threatens a nation's solvency, which is why it is undesirable. The other methods of funding government expenditures with money will have a different set of unfavourable outcomes (Moore, 1987). Reducing deficit size is one of the mainstays of short-term stabilisation and medium-term adjustment plans for developing nations (Keho, 2016). The Ricardian and Keynesian views yield different policy implications; if Ricardian Equivalence holds, the fiscal policy will not be effective (Evans, 1988). On the other hand, if the Ricardian Equivalence does not hold, how the government finances its spending does matter. Deficit financing would increase expenditure on private consumption, overall market price, and domestic interest rate, the crowding out of private investment and hamper growth. It is essential to study the Ricardian proposition as it provides a theoretical benchmark for measuring the impact of deficit financing on the economy (Elmendorf & Mankiw, 1999).

India's Fiscal Imbalance

India's discretionary fiscal policy includes adjusting taxes and spending on the government in

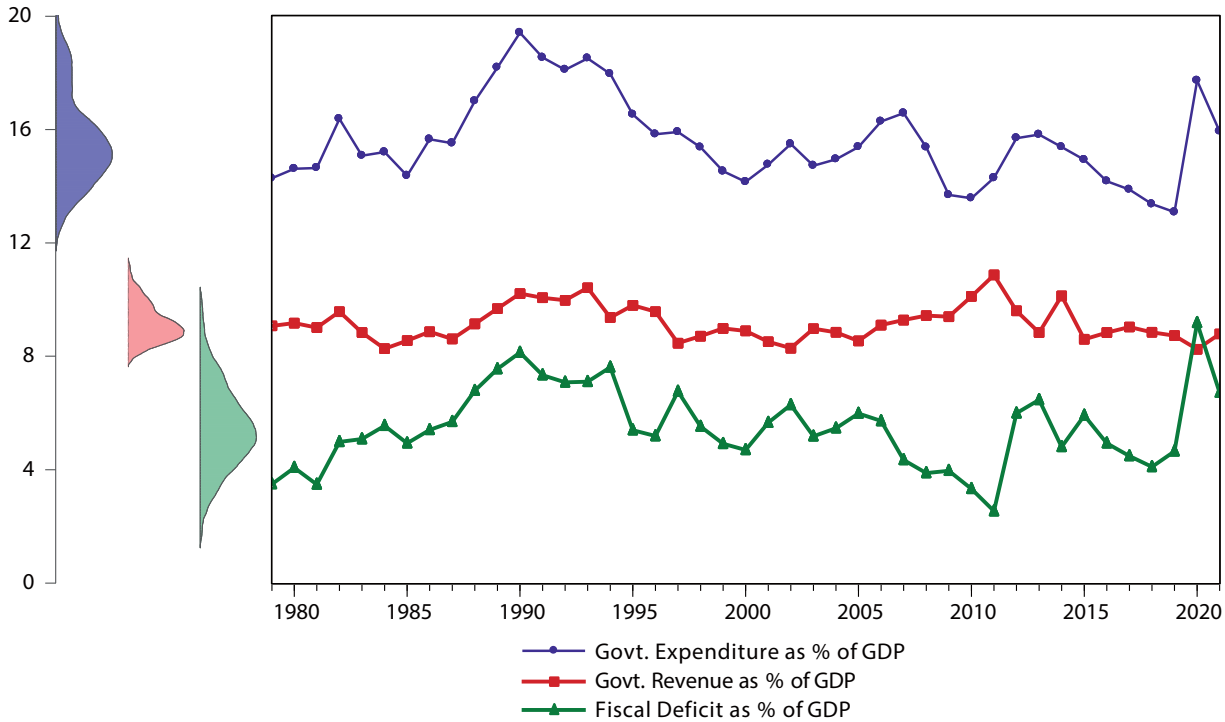

Fig. 1. *Trends of Indian Fiscal Deficit, Government Revenue and Government Expenditure as percent of GDP (source: Author's Calculation using EViews)*

an effort to regulate the economy. The government undertakes fiscal policies that are either expansionary or restrictive to boost or shrink its domestic demand. Budget deficits increase due to rising government spending, which accounts for an average of 15.6 % of GDP from 1988 to 2021 (see Fig. 1). From 1988 through 2021, India's government revenue streams have averaged 9.17 % of GDP, and it has constantly struggled to increase revenues. Due to its heavy reliance on tax revenue (which accounts for 80 % of total revenue), India's large budget imbalance has long been a cause of concern for policymakers (Rangarajan & Srivastava, 2005). The government's significant reliance on tax collection as a source of finance was put to the test in 2008, when the economy slowed down as a result of the global financial crisis. The global financial crisis reduced tax revenue, but at the same time, the government had to increase expenditure to boost domestic demand. As a result, the budget deficit in 2008 increased to 4 % of GDP. The budget deficit increased significantly after 2019 (as a result of COVID-19 fiscal stimulus packages), reaching 9 % of GDP and 6.7 % of GDP, respectively, in 2020 and 2021 (Fig. 1). Such an increasing trend in India's fiscal deficit creates pressure on macroeconomic variables like domestic consumption (because of the high propensity to consume), savings, and general price levels, among others (Pradhan, 2016). This fiscal deficit has to be financed by an increase in taxes or by borrowing (from the domestic market or international institutions).

India has to maintain an 8 % real GDP growth rate in order to reach the goal of having a $5 trillion economy by 2027. Every year, governments invest a significant proportion of their financial resources in improving infrastructure and other support networks to promote more competent and balanced economic growth. Fiscal policy has played a significant role in promoting economic growth and stability in India. If the Ricardian equivalence holds in the Indian economy, households alter their spending patterns and consequently increase their savings, making the policy changes ineffective (Buiter & Patel, 1992; Kaur & Mukherjee, 2012; Pradhan, 2016). The objective of the study is to validate the Ricardian equivalence in the Indian context empirically. It is essential to check whether or not Indian households behave in line with the Ricardian proposition.

2. Literature Review

A growing number of studies have examined the efficacy of these hypotheses. However, the findings of these empirical investigations are inconsistent and debatable across nations, data, and techniques. Most of this research focuses on industrialised nations (Keho, 2016). Early studies (Feldstein, 1982) demonstrated that financing a deficit will significantly affect private consumption. Kormendi (1983) suggested that the stand-

ard approach does not consider people's rational expectations and would support the Ricardian equivalence. Consumption-saving behaviour is based on a person's rational expectations about the impact of fiscal measures. Kormendi's consolidated method received several comments and replies (Barth et al., 1986; Feldstein & Elmendorf, 1990; Graham, 1995; Graham & Himarios, 1991, 1996; Modigliani & Sterling, 1986; Modigliani & Sterling, 1990). Modigliani and Sterling (1986; 1990) criticised Kormendi (1983) contended that the Ricardian equivalence and the life-cycle theory were incompatible with Kormendi's definition, and that wealth, taxation, and government spending all had an impact on consumption. Seater and Mariano (1985) have estimated the consumption function and their findings are consistent with the Ricardian equivalence hypothesis. Kormendi and Meguire (1995) eased the constraints imposed by Modigliani and Sterling and therefore dismissed the restrictions. Feldstein and Elmendorf (1990) concluded that an increase in taxes had a significant impact on consumer expenditure and that an increase in government spending would have no impact on consumption, which would invalidate the Ricardian equivalence. In addition, they argue that the results of Kormendi's study favour the Ricardian equivalence due to the inclusion of the Second World War years. These were years characterised by scarcity, rationing, and patriotic self-restraint appeals, which led to an abnormally high rate of savings at a time when government budget deficits were huge. Butkus et al. (2021a; 2021b) found that an increase in public debt to GDP ratio is more likely to result in a positive debt effect on private consumption and investment. A positive relationship between public debt and private consumption and economic growth was found in China by Gu et al. (2022). Sardoni (2021) rejects the Ricardian Equivalence on two grounds. First is the economic role of the state as merely 'parasitic'. Second is the unwarranted extension of the microeconomic analysis of debts to the macro-economic level. Further, it was found that the government may help increase the rate of economic growth and guarantee a steady and sustainable ratio of the public debt to GDP by reorganising its spending (also see Banday & Aneja, 2019; Pickson & Ofori-Abebrese, 2018).

In Asian economics, especially in the Indian context, there are not many studies on the effect of deficit financing on consumption. Gupta (1992) checked the Ricardian proposition in 10 developing countries and reported that the Ricardian equivalence is marginally accepted in South Korea, Pakistan, Singapore, and Thailand but gets rejected in India, Indonesia, the Philippines, and Sri Lanka; the evidence for Malaysia and Taiwan is inconclusive (also see Suhartoko et al., 2022). Ghatak and Ghatak (1996) reject the Ricardian equivalence in India since estimates indicate that private investment significantly crowds out due to deficit financing. Pradhan (2016) examined the Ricardian equivalence concerning India's fiscal sustainability. The study utilised an alternative model recommended by early studies (Buiter & Tobin, 1978; Kormendi, 1983). The research refuted the existence of the Ricardian equivalence in India using data from 1947 to 2011, showing that the fiscal policy followed in India throughout the study period was detrimental to generational welfare neutrality.

Kusairi et al. (2019) examined how government debts affected individual consumer spending. Through the use of dynamic heterogeneous panel data analysis, their study indirectly examines the existence of the Ricardian equivalence proposition in differentiated financial development for the annual data of 18 nations from the Asia Pacific region, including India, from 1990 to 2017. The findings indicate a long-term co-integrated link between government debt and private consumption, and in the overall framework, the Indian economy exhibits Ricardian equivalence over both the long term and the short term (also see Badaik & Panda, 2022; Munir & Mumtaz, 2021). Additionally, private consumption is positively impacted by income, capital accumulation, government spending, real interest rates, and inflation. The main conclusion from these findings is that, while financial progress does not have a varied impact for various nations, it does not give proof for the existence of the Ricardian equivalence. Mohanty (2019) suggests that both in the long and short runs, a budget deficit discourages private investment. The findings also indicate that domestic fiscal deficit financing has a major detrimental effect on private investment. The effects of the interest rate system and liquidity constraints on private investment decisions have not been taken into account in the study. Singh (2017) fails to validate the Ricardian equivalence in India by examining the responsiveness of private savings to public savings in India. Estimates indicate that the increases in household saving are because of factors such as savings incentives, an institution of savings schemes, self-driven motivation to save, and the precautionary accumulations induced by uncovered uncertainties in incomes, rather than by the Ricardian behaviour of households. Mohanty and Panda (2020) used a structural vector autoregression framework to investigate the macroeconomic implications of pub-

lic debt in India from 1980 to 2017. Assessing the effects of public debt on India's investment, inflation, interest rate, and economic development was the objective. The findings of the impulse response functions demonstrate that public debt has negative effects on economic growth and consumption, but positive short-term effects on long-term interest rates, and mixed (both negative and positive) long-term effects on investment and inflation.

To summarise the reviewed literature, empirical studies that have tried to evaluate how financing the deficit funding affects private consumption have yielded different findings, perhaps as a result of the technique, research duration, and sample size. Moreover, it is clear from the research gap that the studies did not account for how liberal trade policy affects consumer spending. According to the Compensation Hypothesis (Rodrik, 1998), which is connected to trade openness, governments in open economies spend more to protect themselves from the risks of being exposed to international markets and economic shocks. Furthermore, in an open economy, private spending rises as well. Mixed results have also been obtained from several studies that examined the effects of trade openness on the Indian economy experimentally (Benarroch & Pandey, 2008, 2012; Dixit, 2014; Hye & Lau, 2014; Karras, 2003; Kumari et al., 2023; Mehta & Mallikarjun, 2023). However, the relationship between liberal trade policy and private consumption cannot be understood in isolation because, on the one hand, the government must spend heavily (creating fiscal deficits) to maintain its trade competitiveness, and, on the other hand, the financing of the fiscal deficit by debt or tax will alter private consumption. Using the Autoregressive Distributed Lag (ARDL) approach, this study examines the relationships between deficit financing, trade openness and private consumption of India.

3. Methodology

The aggregate consumption function can be used to estimate the impact of deficit financing and trade openness on private consumption. The Ricardian equivalence proposes that deficit financing will have no impact on consumption because the private sector is perceived to be rational and far sighted (Barro, 1976). This is because private sector individuals will take into consideration the future tax implied by the current debt. They will also take into consideration that the present value of the future tax is equivalent to the current tax benefit, because it is being substituted with debt financing by the government (Barro, 1976; Evans, 1988). This will make the private sector indifferent to the mode of deficit financing. But according to the Keynesian and neoclassical views, where the private sector is perceived to be myopic, deficit financing will have an impact on private consumption (Elmendorf & Mankiw, 1999; Evans, 1988; Kormendi & Meguire, 1995). The relationship between private consumption and deficit financing can be derived from an individual's lifetime utility function of the life cycle income hypothesis.

$$U = \sum_{t=1}^{T} U(CE_t). \quad (1)$$

Thus, the individual budget constraint will be: U is the total utility received from consumption (CE_t) throughout the course of a consumer's life (where, t is the time period from 1 to T). It is assumed that a person can borrow and save money at an exogenous rate, with the restriction that any existing debt must be paid off at the end of the person's life. As a result, each person's budget will be limited by:

$$\sum_{t=1}^{T} CE_t \le W_0 + \sum_{t=1}^{T} Y_t. \quad (2)$$

The time interval from 1 to T is denoted by t, where W_0 is an individual's wealth and Y_t denotes income. As a result, a person's consumption is lesser than his wealth and income. Since everyone will meet the budget constraint equally and the marginal utility of consumption will be positive, the Lagrangian maximisation function will be:

$$\mathcal{L} = \sum_{t=1}^{T} U(CE_t) + \lambda\left(W0 + \sum_{t=1}^{T} Y_t - \sum_{t=1}^{T} CE_t\right). \quad (3)$$

Following Ramsey (1928), Diamond's (1965) overlapping generation preposition, for consumers under the Ricardian equivalence assumption of rationality (Barro, 1976) is as follows:

$$CE_t + CE_{t+1} / (1+i) = Y_t + Y_{t+1} / (1+i), \quad (4)$$

where Y is income, CE stands for private consumption expenditure, and i is the discounting rate. Current consumption and future consumption (at present value) are equal to current income and future income (at present value) in this instance of equation (4). Current consumption and future consumption (at present value) are equal to current after tax income and future after tax income (at present value) when TX (Tax) is taken into account in equation (5).

$$CE_t + \frac{CE_{t+1}}{1+i} = (Y_t - TX) + \frac{(Y_{t+1} - TX)}{1+i} \quad (5)$$

Assuming that the government has a balanced budget, Government Revenue (GR) = Government

Expenditure (*GE*) (where, Government Revenue = Tax Revenue (*TX*) + Non-Tax Revenue (*NTR*))[1].

$$CE_t + CE_{t+1}/(1+i) = \\ = (Y_t - TX_1) + (Y_{t+1} - TX_2)/(1+i). \quad (6)$$

The optimum scenario of consumption expenditure (*CE*) and disposable income ($Y - TX$) in the balanced budget scenario is presented in eq. (6). However, if there is budget deficit at time *t*, where $TX_1 < TX = GE$ and $\Delta TX = TX - TX_1$ and if we consider GD_t to represent the amount owed by the government, the rise in a person's disposable income will be equal to $GD_t = \Delta TX$. Assuming that the debt would mature in the following year, TX_2 is the tax due at period $t + 1$, and it is also the case that the individual will get interest in addition to the principal amount of GD_t, i. e. $(1 + i)$ $GD_t = GD_{t+1}$, where GD_{t+1} is the value of the government debt at period $t + 1$. In order to obtain eq. (7), we must include GD_t eq. (6).

$$CE_t + \frac{CE_{t+1}}{1+i} = \\ = (Y_t - T_1) + \left(\frac{Y_{t+1} - T_2}{1+i}\right) + (1+i)GD_t. \quad (7)$$

Left-hand side of eq. (7) shows that an individual's total consumption is the sum of current consumption (CE_t) and future consumption ($CE_t / (1 + i)$), where $(1 + i)$ is the discount factor in the economy. Right-hand side of eq. (7) is equal to left-hand side, i. e. the total of current after tax income ($Y_t - TX_1$), the future income ($Y_{t+1} - TX_2$) / $(1 + i)$, receipts of interest, and principal amount of government debt. The government budget is given in eq. (8).

$$\int_{t=0}^{\infty} e^{-it} GE_t dt \le -GD(0) + \int_{t=0}^{\infty} e^{-it} TX_t dt. \quad (8)$$

In eq. (8), government expenditure (GE_t) is less than equal to the government debt (*GD*), and the present value of tax at (e^{-it}) and government debt. The simple way to define the budget deficit is that it is the change in rate of stock of debt D_t.

$$D_t = [GE_t - TX_t] + i(GD) \cdot GD_t. \quad (9)$$

The eq. (10) shows overlapping generation model of government budget.

$$TX_1 + \frac{TX_2}{1+i} = GE_t + \frac{GE_{t+1}}{1+i} + (1+i)GD_t. \quad (10)$$

Eq. (10) is the sum of the current tax revenue and future tax revenue (at present value) is equal to the current government expenditure and future government expenditures (at present value). The private sector will have a challenge with temporal optimisation. max $U = U(CE_t, CE_{t+1})$, subject to eq. (7) and eq. (10), the choice of optimisation relies on eq. (7) for private sector and eq. (10) for government. Future tax obligations are the only thing that fiscal deficits are. The burden of the deficit falls on the following generation if future taxes are not discounted, which in turn lowers their welfare. The government debt cannot raise or lower total consumer spending, according to the Ricardian equivalence hypothesis. The combination of current consumption and future consumption is what is ultimately defined as consumption expenditure. Future government spending may be predicted by the private sector; by substituting eq. (10) into eq. (7) we get eq. (11).

$$\left\{CE_t + \frac{CE_{t+1}}{1+i}\right\} = \left\{Y_t + \frac{Y_{t+1}}{1+i}\right\} - \left\{GE_t + \frac{GE_{t+1}}{1+i}\right\}. \quad (11)$$

Eq. (11) depicts the real budgetary constraint on the private sector; taxes and deficits are not included. Thus, analogous to the Ricardian equivalence, the private sector's optimising behaviour depends on new income, budget constraints, and government spending but not on deficit or taxation. According to Keynesian view, current consumption expenditure CE_t will change due to changes in government expenditure and mode of financing it (debt vs. tax). The current generation will be better off at the cost of the next generation, by passing the burden of repaying the debt. It can be derived that private consumption expenditure is the function of government expenditure, government debt, tax revenue and income (see Barro, 1976; Buiter & Tobin, 1978; Feldstein, 1982; Kormendi, 1983; Pradhan, 2016) as follows:

$$CE_t = f(GE_t, GB_t, TX_t, Y_t). \quad (12)$$

where, *CE* is private consumption expenditure at time *t*, *GE* is government expenditure at time *t*, *GB* is government borrowing at time *t*, *TX* is tax revenue at time *t*, and *Y* as domestic income at time *t*.

Trade Openness and Consumption

According to the Compensation Hypothesis proposed by Rodrik (1998), open economies spend more to protect domestic sectors from the disruption posed by trade openness and foreign markets (see Benarroch and Pandey, 2012; Dixit, 2014; Nguea, 2020). On one hand, the liberal trade policy will lead to an increase in the government spending creating fiscal deficit which in turn will affect

[1] The average share of tax revenue in total revenue in India is 80 %. Calculations are based on data taken from 2020, 2022 and previous issues of 'Handbook of statistics on Indian Economy' published by Reserve Bank of India.https://www.rbi.org.in/scripts/AnnualPublications.aspx?head=Handbook+of+Statistics+on+Indian+Economy#

private consumption expenditure due to deficit financing (debt vs tax). Whereas, on the other hand, liberal trade policy will also result in increased private consumption of foreign goods. By adding trade openness to eq. (12), we get eq. (13)

$$CE_t = f\left(GE_t, GB_t, TX_t, Y_t, TO_t\right), \quad (13)$$

where, *CE* is private consumption expenditure at time *t*, *GE* is government expenditure at time *t*, *GB* is government borrowing at time *t*, *TX* is tax revenue at time *t*, *Y* as domestic income at time *t* and *TO* is trade openness measure as total of exports and imports at time *t*.

3.1. Econometric Model

The study investigates the relationship between the current account deficit, the budget deficit, and trade openness. We used the Autoregressive Distributed Lag (ARDL) bounds testing for the investigation (Pesaran et al., 2001). Hence, eq. (14) represents the ARDL long-run equation of private consumption expenditure (*CE*) as a function of all the explanatory variables such as government expenditure (*GE*), government borrowing (*GB*), tax revenue (*TX*), domestic income (*Y*) and trade openness (*TO*).

$$CE_t = \alpha_0 + \alpha_1 GE_t + \alpha_2 GB_t + \\ + \alpha_3 TX_t + \alpha_4 Y_t + \alpha_5 TO_t + \varepsilon_t. \quad (14)$$

Measuring an ARDL model provides several advantages compared to other cointegration techniques. Initial stationary states for the variables under consideration might be I(0), I(1), or both (Acquah, 2010). The second consideration is the method's suitability for use with smaller sample sizes. The third characteristic distinguishes the long-run and short-run relationships. Lastly, as structural breakdowns in economic time series are usually caused by changes in the political, economic, and international spheres, this approach aids in representing such breaks in the equation (Mehta, 2023; Mehta & Mallikarjun, 2023). In order to look at the cointegration of the variables listed in eq. (14), we estimate the ARDL limits to test for private consumption expenditure as follows in eq. (15):

$$\Delta CE_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta CE_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta GE_{t-i} + \\ + \sum_{i=1}^{n} \alpha_{3i} \Delta GB_{t-i} + \sum_{i=1}^{n} \alpha_{4i} \Delta TX_{t-i} + \sum_{i=1}^{n} \alpha_{5i} \Delta Y_{t-i} + \\ + \sum_{i=1}^{n} \alpha_{6i} \Delta TO_{t-i} + \beta_1 CE_{t-1} + \beta_2 GE_{t-1} + \beta_3 GB_{t-1} + \\ + \beta_4 TX_{t-1} + \beta_5 Y_{t-1} + \beta_6 TO_{t-1} + \varepsilon_t \quad (15)$$

Here Δ represents the first difference operator; $\alpha_1, \ldots, \alpha_5$ and $\beta_1, \ldots, \beta_5$ represent coefficients of the ARDL model in the short-run and long-run coefficients respectively; *i*, *n* represent optimal and threshold lag respectively; ε_t represents the white noise terms.

The computed long-run coefficients in eq. (15) 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 co-integrated $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ (Mehta & Mallikarjun, 2023). We acquire the upper and lower bound critical values along with the *F*-statistics. The null hypothesis is rejected if the finding *F*-statistic is more than the upper bound critical values; it is not rejected if the *F*-statistic is less than the lower bound critical values. If there is a long-term association but the *F*-statistic falls between the upper and lower bound values, the evidence is considered inconclusive (Mehta & Mallikarjun, 2023). 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:

$$\Delta CE_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta CE_{t-i} + \sum_{i=1}^{n} \alpha_{2i} \Delta GE_{t-i} + \\ + \sum_{i=1}^{n} \alpha_{3i} \Delta GB_{t-i} + \sum_{i=1}^{n} \alpha_{4i} \Delta TX_{t-i} + \sum_{i=1}^{n} \alpha_{5i} \Delta Y_{t-i} + \\ + \sum_{i=1}^{n} \alpha_{5i} \Delta TO_{t-i} + ECT_{t-1} + \varepsilon_t \quad (16)$$

3.2 Data

Data of Private Consumption Expenditure (*CE*), Government Expenditure (*GE*), Government Borrowings (*GB*), Tax Revenue (*TX*) and Total of exports and imports as a measure of Trade Openness (*TO*), are taken from RBI Handbook of Statistics-2020, 2022 and previous issues[1]. The log values of the variables during the period from 1988 to 2021 are used for the analysis (Barro, 1976; Dixit, 2014; Feldstein, 1982; Kormendi, 1983; Kumari et al., 2021; Kusairi et al., 2019; Mohanty & Panda, 2020; Pradhan, 2016; Yellen, 1989). The nominal variables are deflated into real ones by the GDP deflator (2004–05 constant price).

4. Results and Discussions

Table 1 represents the descriptive statistics of each variable. The average *CE*, *GE*, *GB*, *TX*, *Y* and

[1] Data is taken from 2020, 2022 and previous issues of 'Handbook of statistics on Indian Economy' published by Reserve Bank of India. https://www.rbi.org.in/scripts/AnnualPublications.aspx?head=Handbook+of+Statistics+on+Indian+Economy#

Table 1

Descriptive Statistics and Correlation Matrix

	CE	*GE*	*GB*	*TX*	*Y*	*TO*
Mean	9.989423	8.591972	9.804102	7.829366	10.46922	9.351631
Median	9.902832	8.521147	9.926436	7.809886	10.43099	9.517684
Maximum	11.09148	10.4488	11.68545	9.515545	11.56293	10.70554
Minimum	9.119079	6.673437	7.620828	5.821595	9.495885	7.550472
Std. Dev.	0.59707	1.130725	1.223379	1.223846	0.634393	1.070571
Skewness	0.20586	–0.07847	–0.19661	–0.07377	0.085079	–0.30392
Kurtosis	1.775242	1.724423	1.788369	1.609243	1.725148	1.621567
Jarque-Bera	2.365189	2.339948	2.298776	2.770961	2.343451	3.215174
Probability	0.306483	0.310375	0.316831	0.250204	0.309832	0.20037
Correlation Matrix						
CE	—					
GE	0.9922*	—				
GB	–0.9866*	0.9973*	—			
TX	–0.9899*	0.9951*	–0.9946*	—		
Y	0.9987*	0.9958*	0.9927*	0.9948*	—	
TO	0.9691*	0.9865*	0.9900*	0.9901*	0.9790*	—

*, **, *** indicate significance at 1 %, 5 % and 10 %, respectively.
Source: Authors Calculation using EViews.

TO are 9.989, 8.591, 9.804, 7.829,10.469 and 9.351, respectively. The standard deviation of each underlying variable is less than its mean value, indicating stable variation among the variables over the sample period. The Jarque-Bera test statistic upheld the normal distribution of all the variables. The correlations between *CE* and *GE* (0.992), *GB* (–0.986), *TX* (–0.989) and *TO* (0.96) give evidence of the relationship between private consumption expenditure, government debt, tax revenue and trade openness (Feldstein, 1982; Kormendi, 1983; Pradhan, 2016). Furthermore, a positive correlation between *TO* and *CE* (0.96) as well as *GE* (0.986) shows a positive impact of trade openness on *CE* and *GE*, asserting to the Compensation Hypothesis (Dixit, 2014; Kumari et. al, 2021; Rodrik, 1998). Hence, ARDL bounds test is employed to examine the magnitude and direction of the relationship between consumption expenditure, mode of deficit financing and trade openness.

To avoid spurious results, the primary constraint of *ARDL* is that the series should not be integrated at the order I(2). The Augmented Dickey–Fuller (*ADF*) and Phillips–Perron (*PP*) tests are used to check the stationarity of the series. Table 2 shows the results of unit root tests.

Table 2

Results of Unit Root Tests

Variables	Intercept and trend	Intercept	Intercept and trend	Intercept
	ADF		***PP***	
	Level form			
CE	–1.1442	3.0832	–1.1442	3.0832
GE	–3.6394	–0.3017	–2.2041	–0.5224
GB	–1.4470	–2.2960	–1.0956	–3.6206
TX	–0.6287	–1.3611	–0.6287	–1.3447
Y	–2.3430	1.4720	–2.2813	1.6862
TO	–0.2245	–1.7210	–0.4565	–1.5837
	First Differenced			
CE	–4.8591*	–3.6059*	–4.8591*	–3.5857*
GE	–3.8345**	–4.0205*	–1.3339**	–1.4852**
GB	–4.1555**	–2.8939**	–2.7047**	–2.8248**
TX	–4.5065*	–4.3622*	–4.4061*	–4.2485*
Y	–4.6764*	–4.3968*	–4.5098*	–4.2815*
TO	–4.7165*	–4.3464*	–4.7022*	–4.3496*

*, **, *** indicate significance at 1 %, 5 % and 10 %, respectively.
Source: Authors Calculation using EViews.

Table 3

ARDL Bounds Test Results

	ARDL	
F-Statistics	20.8864*	
Significance	Lower Bound	Upper Bound
10 %	2.2	3.09
5 %	2.56	3.49
1 %	3.29	4.37

* indicates a 1 % statistical significance level.
Source: Authors Calculation using EViews.

Table 4

Results of short-run and long-run relationship using ARDL model

Variables	ARDL Coefficient (Prob.)
Short Run Coefficients	
Δ Private Consumption Expenditure (*CE*(–1))	0.7419 (0.000*)
Δ Government Expenditure (*GE*)	0.0434 (0.061***)
Δ Government Expenditure (*GE*(–1))	0.3112 (0.000*)
ΔGovernment Expenditure (*GE*(–2))	–0.0453 (0.0896***)
ΔGovernment Debt (*GD*)	–0.2376 (0.001*)
Δ Government Debt (*GD*(–1))	–0.4207 (0.000*)
Δ Tax (*TX*)	–0.2101 (0.000*)
Δ Tax (*TX*(–1))	0.0989 (0.000*)
Δ Income (*Y*)	1.2467 (0.000*)
Δ Income (*Y*(–1))	0.1382 (0.0621***)
Δ Income (*Y*(–2))	0.4953 (0.000*)
Δ Trade Openness (*TO*)	0.0351 (0.000*)
Δ Trade Openness (*TO*(–1))	0.1172 (0.000*)
Δ Trade Openness (*TO*(–2))	–0.0579 (0.001*)
ECT(–1)	–0.1037 (0.000*)
Long Run Coefficients	
Government Expenditure (*GE*)	0.2442 (0.008*)
Government Debt (*GD*)	–0.4071 (0.005*)
Tax (*TX*)	–0.4244 (0.058***)
Income (*Y*)	1.6324 (0.000*)
Trade Openness (*TO*)	0.2676 (0.0945***)
Constant	–4.1707 (0.0405**)
Diagnostic tests	
R-squared	0.9946
Adjusted *R*-squared	0.9870
Normality [Jarque-Bera (*p*-value)]	1.8604 (0.394)
Serial correlation [LM Test *F*-statistic (*p*-value)]	13.6340 (0.614)
Heteroscedasticity [Breusch-Pagan-Godfrey (*p*-value)]	0.8841 (0.673)
Ramsey RESET Test [*F*-statistic (*p*-value)]	1.7360 (0.244)

*, **, *** indicate significance at 1 %, 5 % and 10 %, respectively.
Source: Authors Calculation using EViews.

The unit root test estimates are measured at a level and first difference series. The results of ADF and PP confirm the stationary at I(1). Further, the results of unit root tests confirm that none of the series is I(2), which satisfies the first condition of ARDL.

Table 3 presents *ARDL* bounds test estimates. The estimated *F*-Statistics for *ARDL* surpasses 99 % upper bound, which indicates that the null of no cointegration cannot be accepted. The *F*-statistics estimates assert linear cointegration among private consumption expenditure (*CE*) as a dependent variable and explanatory variables, such as government expenditure (*GE*), government borrowing (*GB*), tax revenue (*TX*), domestic income (*Y*) and trade openness (*TO*). Table 4 presents the long-run and short-run coefficients of the *ARDL* co-integrating equation xeq. (14), eq. (15) and eq. (16)] respectively.

The estimates show long-run cointegration between private consumption expenditure (*CE*) and government expenditure (*GE*). The positive and significant coefficient implies that a 1 % increase in government spending will lead to a 0.24 % increase in private consumption expenditure. This relationship is consistent with previous studies on consumption (see Buiter & Tobin, 1978; Feldstein, 1982; Kormendi, 1983; Pradhan, 2016). Furthermore, the long-run coefficient of government debt (*GD*) measures the impact of debt financing on private consumption expenditure (*CE*).

The negative and significant long-run coefficient value of government debt (*GD*) shows that a 1 % increase in government debt will lead to a 0.40 % reduction in private consumption expenditure. The private sector will reduce consumption and invest in risk-free government debt instruments. It can be inferred that private consumption expenditure is not indifferent to the debt mode of financing fiscal deficit, rejecting the Ricardian preposition (see Kormendi, 1983; Kormendi & Meguire, 1995; Kusairi et. al, 2019; Mohanty, 2019; Mohanty & Panda, 2020; Singh, 2017). The negative and significant tax coefficient (*TX*) shows that a 1 % increase in tax will lead to a 0.42 % decrease in private consumption expenditure. The estimates support the previous studies, which observed that the tax mode of financing the fiscal deficit would reduce the consumption of the private sector (see Kormendi, 1983; Kormendi & Meguire, 1995; Pradhan, 2016).

The estimates assert the long-run relation between trade openness (*TO*) and private consumption expenditure (*CE*). The positive and significant coefficient shows that a 1 % increase in trade openness will lead to a 0.26 % increase in private consumption expenditure. It can be inferred that an open economy leads to an increase in consumption which indirectly supports the Compensation Hypothesis (Kumari et. al, 2021; Rodrik, 1998).

The results reject the Ricardian Equivalence and propound the Keynesian approach that the mode of financing deficit (debt vs tax) does matter to the consumption behaviour.

Estimates of the short-run model are presented in Table 4. In the short run, government expenditure, government debt, tax, income and trade openness significantly impact private consumption expenditure. Short-run estimates show that changes in CE_{t-1} lagged values have a 0.74 % positive impact on private consumption expenditure. Similarly, changing the lagged values of GE_{t-1} increases CE_t by 0.38 %, whereas changing the lagged values of GD_{t-1} and TX_{t-1} reduces CE_t by 0.42 % and 0.09 %, respectively. These estimates confirm the Keynesian hypothesis and reject the Ricardian Equivalence. 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 %, 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 10.3 % in the *ARDL* model.

The diagnostics of the Model are reported in Table 4. According to the diagnostic tests, the Model is consistent. Adjusted R^2 of the estimated consumption function is 0.98, which is in line with the previous studies on the Ricardian equivalence; these studies have estimated the aggregate consumption function and have observed similar R^2 values (adjusted $R^2 = 0.999$ (Kormendi, 1983); adjusted $R^2 = 0.91$ (Bernheim & Bagwell, 1988); adjusted $R^2 = 0.9917$ (Moore, 1987); adjusted $R^2 = 0.99$ (Feldstein & Elmendorf, 1990); adjusted $R^2 = 0.99$ (Pradhan, 2016)). The results of the Jarque-Bera and *LM* tests confirm the normally distributed residuals and no serial correlation, respectively. The Model is well-fitted according to the Ramsey functional form and free from heteroscedasticity. The variance inflation factor (*VIF*) confirms the absence of multicollinearity among the variables (see Table 5). The Model's stability using the CUSUM and CUSUMSQ tests is present in Figure 2 for both models. It is apparent that the Model is stable during structural breaks and confirms the stability of long-run estimates.

5. Conclusion

The current study uses time series data from 1988 to 2021 on tax, income, trade openness, government debt, private consumer spending, and government expenditure to examine both short- and long-term associations using the autoregressive distributed lag model. The variables are stationary at the I(1) order of integration. The long-term relationship between the variables is validated using the ARDL bounds test. The impact of deficit financing on India's private consumption spending is measured by aggregate consumption expenditure.

An increase in public spending will lead to a rise in private consumption, according to estimates from the aggregate consumption function; public spending is a complement to private consumption spending. According to estimates, a fiscal strategy that expands government spending will be successful because rising government spending will be followed by rising private consumption. The private consumption is not Ricardian since the governmental expenditure coefficient is not zero (substitute). Given that the co-

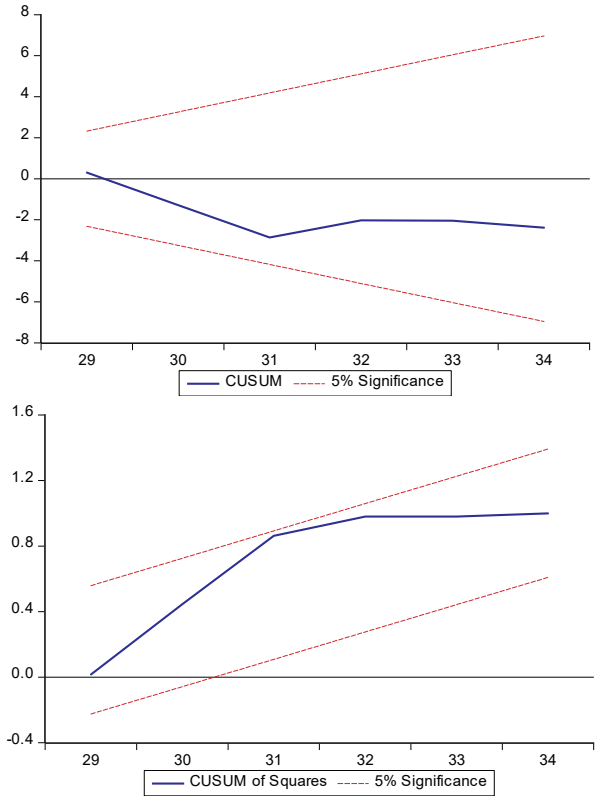

Fig. 2. *Plots of CUSUM & CUSUM of squares (source: Authors Calculation using EViews)*

Table 5

Results of Variance Inflation Factor

Variable	Coefficients	Prob.	VIF
Government Expenditure (*GE*)	0.2442	0.008*	1.5626
Government Debt (*GD*)	–0.4071	0.005*	1.7820
Tax (*TX*)	–0.4244	0.058***	2.2540
Income (*Y*)	1.6324	0.000*	2.1451
Trade Openness (*TO*)	0.2676	0.094***	1.9086
Constant	–4.1707	0.0405**	—

*, **, *** indicate significance at 1 %, 5 % and 10 %, respectively.
Source: Authors Calculation using EViews.

efficient value is larger than zero, government expenditure is indeed Keynesian. The behaviour of private consumption expenditure supports the Keynesian paradigm. Considering the potential for crowding out of private investment in India due to excessive government bond issuance, the policy of deficit financing should be handled with appropriate prudence. This will impede capital accumulation and economic growth. The estimates demonstrate that the impact of government debt on private consumption expenditure is negative and large. The Ricardian equivalency is invalid because government debt has an impact on private consumption. The Ricardian equivalence hypothesis is refuted by the large tax revenue coefficient, which indicates that a tax increase will result in a shift in private consumption. Moreover, tax financing will impact people's consumption and create a deficiency in demand. Thus, Indian consumers are sensitive to the tax mode of deficit financing. Moreover, private consumption is also sensitive to changes in domestic income. It fails to validate the Ricardian equivalence hypothesis as Indian consumers are sensitive to tax and debt modes of financing (accepting the Keynesian proposition).

Policy Implications

The aggregate demand of Indian consumers would be impacted by the implementation of an expansionary fiscal policy (raising expenditure). Private domestic consumption is strongly impacted by over dependence on debt financing strategies. However, prudently employing public debt as a source of deficit financing can assist in bringing resources from the future to the present. Suppose the government plans to use tax financing for the deficit. In this case, it will also impact private domestic consumption (consumption function estimates show that the coefficient of tax revenue significantly impacts private consumption expenditure).

Due to its open economy, India must spend more to shield its domestic industries from the disruption that trade openness and foreign markets bring (see Benarroch & Pandey, 2012; Dixit, 2014; Mehta & Mallikarjun, 2023; Nguea, 2020). Trade openness has an impact on India's current account deficit. It suggests that even while India's open trade policies will lead to higher government expenditure to protect domestic businesses from outside threats, the nation's current account and budget deficits will probably get worse (Dixit, 2014; Mehta & Mallikarjun, 2023; Rodrik, 1998). If the government raises taxes, an increase in taxation will lower the current account deficits by reducing private domestic demand for imported products (as individuals' disposable income reduces). Thus, for policymakers, shifting to taxation can be an alternative for debt financing of the deficit.

This study contributes to the existing literature on the Ricardian Equivalence and trade openness by giving new evidence on designing sustainable fiscal policy by spending wisely without imperilling the country's consumption expenditure and efficient mode of deficit financing. Also, this work provides a framework to explore the relationship between trade openness, consumption spending, and deficit financing in more detail. The research focus of this study may be expanded by taking into account the panel of comparable economies, since the global analysis may provide more insights than a country-specific examination.

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Дата поступления рукописи: 21.10.2022. Received: 21 Oct 2022.
Прошла рецензирование: 20.12.2022. Reviewed: 20 Dec 2022.
Принято решение о публикации: 19.09.2023. Accepted: 19 Sep 2023.