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The Dynamic Impact of Taxation on the Economic Growth of Sri Lanka: An ARDL bounds testing approach

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Abstract

Discussions on how a government can stimulate an economy through non-distortionary taxation and productive government expenditures have become prominent during the past three decades. Against this backdrop, this paper aims to analyse the short-run and long-run impacts of taxation on the economic growth of Sri Lanka. Some taxes can be distortionary, while others are not. Therefore, while analysing the effect of overall tax level on economic growth, we also estimated the distortionary nature of major tax categories on the economic growth of Sri Lanka. Sri Lanka presents a unique case to analyse the nexus between taxation and economic growth, as the economy was liberalized in 1977. Therefore, the impact of taxation level on economic growth was estimated using a linear Auto-Regressive Distributed Lag (ARDL) model under two scenarios: without controlling for economic liberalization (from 1960 to 2018) and the post-liberalized period (from 1980 to 2018). The results of both pre-and post-economic liberalization conditions suggest a significant long-run positive impact of tax level on economic growth. Similarly, the impact of consumption tax on short-run economic growth was significant. In addition, personal and corporate income taxes were non-distortionary, both in the short-run and the long-run, while consumption taxes were non-distortionary in the

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long-run. This suggests that increasing taxes is a viable policy option in achieving fiscal independence without compromising Sri Lanka's growth potential.

Keywords: *ARDL, Economic Growth, Fiscal policy, Public Sector, Tax Levels, Tax Structure*
JEL: C32 E62, H21, O47

Introduction

The general business sentiment around taxes is that, the higher the taxes, the more likely businesses would leave the formal sector. This would discourage private investment leading to a decline in economic growth (World Bank, 2019). Taxes would also finance government expenditures which can be invested in productive sectors that develop physical and human capital. A tax system would effectively transfer resources from the private sector to the public sector allowing the public sector to finance investments. Also, taxes would direct private investments to desired avenues and influence relative factor prices (Waidyasekera, 2016). Hence taxes can have contrasting impacts on different economies, where particularly in developing economies, higher taxes are deemed beneficial, if not necessary, in driving the economy (Ricciuti, Savoia & Sen, 2019).

The existing literature has identified contrasting effects on the impact of taxation on economic growth. While some scholars have identified the impact of taxation on economic growth as distortionary, others have found no such negative impact. Therefore, the objective of this study is to analyse the short-run and the long-run impact of taxation on the economic growth of Sri Lanka. The distortionary effect of taxation on economic growth can be identified under two paradigms, i.e., due to the tax level and the tax structure (Arnold, 2008). The tax level is the total tax collection in the economy, while tax structure refers to individual tax types. Therefore, identifying the growth implications of the tax level is vital in deciding if overall tax levels should be lowered to allow for economic growth. Further, recognising the growth implications of different tax structures is also helpful since this can enable the government to focus on categories of taxes that have no positive impact on economic growth to support their fiscal programmes. Therefore, in this study, to achieve the objective of identifying the effect of taxation on the economic growth of Sri Lanka, we analysed the impact of tax under the paradigms of tax level and tax structure.

One of the twin deficits that negatively affect the Sri Lankan economy is the fiscal deficit. The fiscal deficit is large and is continuously widening due to insufficient government revenue supported by unsustainable spending. The requirement of countering the piling public debt caused by persistent fiscal deficits was re-iterated through the global monetary bodies (IMF, 2019). As per the annual reports of the Central Bank of Sri Lanka (CBSL), since tax contributes to around 90% of total government revenue, enhanced taxation can effectively reduce this fiscal deficit. However, raising taxes may lead to sacrifices in the long-run aggregate growth of any economy. Therefore, Sri Lanka needs to make a trade-off decision on this aspect. This research is expected to lay the foundation for a solution by specifying the implications of tax cuts or hikes on economic growth.

CBSL classifies tax revenue in Sri Lanka into five components: Income Taxes, Value Added Tax, Excise Taxes, Taxes on foreign trade, and Other Taxes (Central Bank of Sri Lanka, 2019). Income taxes are charged on the personal income of households (PIT) and profits of corporates (CIT). Consumption taxes were initially introduced as Business Turnover Tax (BTT). In 1996, the Goods and Services Tax implemented along with the National Security Levy (NSL) replaced BTT. These two taxes were merged in 2002 and termed VAT (Waidyasekera, 2016). For this study, BTT, NSL, and the recently introduced Nation Building Tax (NBT) are also considered VAT due to similarities in the imposition of these taxes.

Excise Taxes are special consumption taxes charged on commodities by the government to restrict and direct consumption. Selective Sales Taxes, which were in force in the 1980s and in the early 1990s, were also considered excise duties in the context of this study. Taxes on foreign trade mainly involves custom duties and special commodity levies charged on international trade that would primarily direct imports of an economy. Other Taxes consisted of the balance taxes, which do not fit into any of the above categories. Despite rising in absolute terms (Figure 1), the Sri Lanka tax to GDP ratio has declined over time (Figure 2), indicating that the tax revenue has not kept up with the rising incomes.

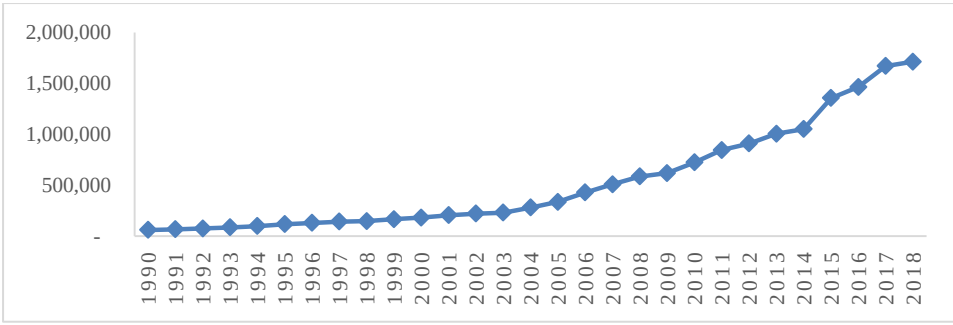

Figure 1 – Absolute Tax Revenue in Rs "Million", 1990-2018

Source: Annual Reports of Central Bank of Sri Lanka, 1990-2018.

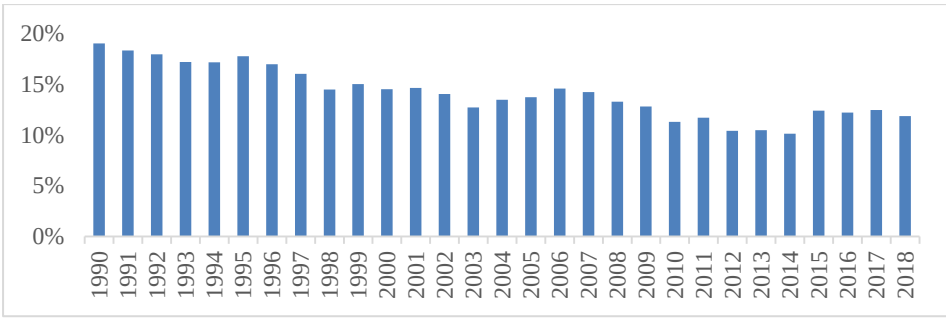

Figure 2 – Tax Revenue as a Percentage of GDP, 1990-2018

Source: Annual Reports of Central Bank of Sri Lanka, 1990-2018.

As per World Bank data, despite being a lower middle-income country, the tax ratio of Sri Lanka lags behind the current global and lower middle-income average ratios. The ratio is also marginally lower compared to the South Asian average as well (Figure 3). These conservative trends suggest that the Sri Lankan taxation system has not kept up with the rising incomes.

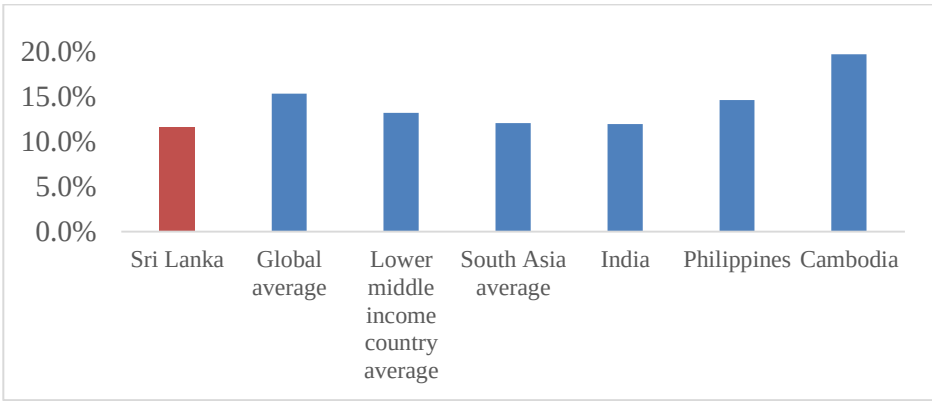

Figure 3 – Comparison of Sri Lankan Tax Ratio to Peer Countries

Source: World Development Indicators, 2020, World Bank.

Literature Review

Classical Economics that pioneered modern economic thought viewed that an economy's long-run economic capacity can only be affected by increased productivity on the supply side (Greenwald & Stiglitz, 1987). Later with the Keynesian school of thought, it was identified that the short-run economic expansion could be achieved through monetary or fiscal policies by influencing the aggregate demand as well (Marglin, 2018). However, when considering the long-run growth, the role of the public sector was not determined in either of these economic standpoints.

Later these theoretical backgrounds were extended into economic models used to explain long-term economic growth over the 20th century. For example, Harrod-Domar's economic model, which came into prominence towards the end of the second world war, identified investments as a critical factor in changing the capital stock and leading to long-term economic growth. (Kari, n.d.). In 1956, Solow and Swan modelled economic growth as a function of labour and capital. This model determined the long-run economic growth rate based on population growth and the rate of technological change. This model was followed up by Romer and Lucas's endogenous growth model, which incorporated aspects such as human capital accumulation and research expenditure in determining long-run economic growth (Kesavarajah, 2016).

Romer (1986) ruled out the exogenous nature of technological change and identified that investment in research on physical capital led to the knowledge that drives economic growth. Contrastingly, Lucas (1988) identified human capital as a leading determinant of economic growth. According to him, investment in human capital had higher spill-over effects on increased technology than investments in physical capital. Despite the progression of economic models over history, none of the above economic models factored in the impact of the public sector as a determinant of long-term growth. Initially, fiscal policy implications were thought to impact an economy's short-run output rather than its long-run growth rate. While the steady-state long-run economic growth was driven by the exogenous factors of population growth and technological progress, the fiscal policy could only affect the transitionary path to this steady-state (Kneller *et al.*, 1999).

However, Barro (1990) incorporated the impact of the public sector to a constant return model of economic growth. He argued that if the government

invests the tax revenue in productive sectors, the distortion in production incentives would be offset by increased factor productivity.
Barro's endogenous model classified the elements of the public sector into four categories: distortionary and non-distortionary taxes and productive and non-productive expenditures (Kneller *et al.*, 1999). Distortionary taxes and productive public spending were deemed to affect the long-run steady rate of economic growth. Thus, the need to incorporate the fiscal sector in determining the economy's growth model was felt. As a representation of the fiscal sector, the basis for using taxation in deciding the economic direction of a country was explored over the next three decades.

Easterly and Rebelo (1993) and Mendoza *et al.* (1997, 1994) found no relationship between an economy's growth rate and the changes in tax rates. Apart from a few selected studies such as this, most other studies have concluded the positive impact of tax cuts on economic growth. For example, Scully's (1996) study in New Zealand identified that the tax rate that maximizes economic growth is far less than the rate that maximizes tax revenue. Romer and Romer (2010) determined that tax changes would significantly affect an economy's output where a tax increase of one percent of GDP would decrease GDP by almost three percent.

Kneller et al. (1999) identified that certain taxes could be distortionary to economic growth, while some other taxes are non-distortionary taxes, which had no impact on economic growth. A distortionary effect of income taxes on economic growth was highlighted in studies conducted by Mertens and Ravn for the United States (2013), Macek (2015) for OECD economies, and Holcombe and Lacombe (2004) for the United States as well. Lee and Gordon (2005) found that while corporate taxes (CIT) have a significant negative association with growth, personal income taxes (PIT) do not. Jelena *et al*. (2018) and Szarowska (2011) further supported this view based on their studies for OECD countries and the European Union, respectively. This non-distortionary effect of PIT was also endorsed by Piketty et al. (2014) in their research on the US and other OECD economies. Arnold (2008), in his study of OECD economies, further identified that the negative relationship of PIT on economic growth would depend on the strength of progressivity of the tax system.

Ferede and Dahlby's (2012) analysis on Canada found an unexpected effect of consistent sales taxes positively correlating to growth. This was primarily

because having a higher sales tax ratio replaced other forms of taxes that discourage investments. This growth-friendly nature of consumption taxes was also supported by the studies of Arnold (2008), Arnold *et al.* (2011), and Szarowska (2013). In addition, Wang and Yip's (1992) also identified that the growth-friendly nature of consumption taxes offset the negative effect of factor taxation (taxation on physical and human capital).

Jaimovich and Rebelo (2017) took a new take where they found in a low-developed economy that the marginal entrepreneur's ability is relatively low where increasing taxes leads to a slight decline in the growth rate. In contrast, in a highly developed economy, the ability of the marginal entrepreneur is comparatively high. So, in a developed economy, increasing the tax rates may lead to such high-ability entrepreneurs' exiting the production process, resulting in a significant decline in the growth rate. In contrast, for a less developed economy, this impact would be comparatively low. Bania *et al.* (2007) also confirmed this distortionary nature of higher tax levels. They found that the cumulative effect of taxes resulting in productive government expenditures and investments is initially positive but eventually declines with higher tax levels.

As discussed above, the existing literature reflects multiple and contradicting conclusions, particularly to the impact of the tax structure on economic growth. Certain taxes, such as sales taxes, were even found to impact economic growth positively. In considering the Sri Lankan context, the available literature in the area is extremely limited. Kesavarajah (2016) conducted an empirical study using the Johansen cointegration test and found that the overall tax burden did not have a significant impact on the economic growth of Sri Lanka. However, on analysing the impact of individual taxes, it was concluded that total income taxes and other taxes had a significant negative impact on output growth. In contrast, consumption taxes (VAT) showed a significant positive effect. Excise taxes were shown not to have any impact, while taxes on foreign trade also negatively impacted growth.

We hope to address the impact of personal income taxes and corporate taxes separately instead of considering total income taxes as a whole. Further in Kesavarajah's (2016) study, the models specified included total tax burden (tax level) as a control variable in estimating the impact of an individual tax category (tax structure) in each model. We believe this would lead to double counting of the specified individual tax. In this study, we hope to eliminate this issue.

Methodology

The research approach is deductive, where the data used was secondarily sourced from the databanks of the Central Bank of Sri Lanka and the World Bank. As identified previously, the impact of taxation on economic growth can be discussed under the impact of the tax level and the impact of the tax structure. Therefore, the methodology for the study was factored around these two paradigms. Through this study, we aim to measure the impact of taxation on economic growth. Thus, we employed GDP at current prices as a proxy for the dependent variable. As for the key independent variable, we have used the tax revenue. Regarding other independent variables to be used in the analysis, we have considered the following variables based on the existing literature.

As stated, Barro's (1990) growth model suggested that government expenditures support long term economic growth given that they are productive. Generally, a government's consumption expenditure is considered 'unproductive' because it affects only the consumers' welfare but does not affect economic production efficiency. On the other hand, investment expenditure is treated as 'productive' (Kesavarajah, 2016). This is further supported through the literature in the studies of Bania *et al.* (2007) and Romer and Romer (2010).

The CBSL classifies government expenditure into three sectors: re-current expenditure, capital expenditure, and lending minus repayments. Re-current expenditure would include expenditure on goods and services, private transfer payments, and interest payments on public debt, all of which can be considered unproductive. Therefore, in this study, we have used a ratio of capital expenditure and lending minus repayments as a percentage of the total annual government expenditure as a proxy for the level of productive public investments.

Another important determinant of long-run economic growth is the level of human capital in an economy. In this study, to incorporate the growth of human capital, the growth rate of the working-age population (population aged 15 to 64), an internationally accepted indicator of the total number of people ready and able to work (OECD, 2019), was used. Arnold et al. (2011), Ferede and Dahlby (2012), and Lee and Gordon (2005) have used some indicators of human capital in their studies. In addition, Bania et al. (2007) have used the population between the ages 18-64 as a proxy for human capital.

Investment expenditures in an economy would determine the increase of capital stock, directly affecting long-term economic growth. Many studies have

incorporated these investment expenditures as a control variable. See Jelena et al., (2018), Arnold et al (2011) and Ferede and Dahlby, (2012). We have proxied the level of investments in the economy through the Gross Fixed Capital Formation.

Another determinant of a country's long-run production is its involvement in international trade (Daumal, 2010). Arnold et al. (2011), Easterly and Rebelo (1993), Lee and Gordon (2005) have included the impact of international trade in their studies conducted in this area. Trade openness, which is the sum of imports and exports value expressed as a percentage of the GDP, represents exposure to international trade in our study.

Model Specification

The baseline model is based on Barro's (1990) model, where the output of the economy (Y) is considered to be a function of physical (K) and public capital (G) inputs. The output function is of Cobb-Douglas nature, where a level of economic efficiency (A) to combine the relationship between private and public capital is introduced.

$$Y=A\,K^{1-\alpha}\,G^{\alpha`} \qquad (1)$$

Based on Barro's framework, we have extended the production function in equation (1), incorporating other explanatory variables as seen in previous literature as follows (Table 1).

$$Y= f\,(PV, HC, GOVT, TAX, TR) \qquad (2)$$

Table 1: Variables used in the study

Variable	Indicator	Abbreviation	Source
Y	Log (GDP at current prices)	LGDP	CBSL
TAX	Log (Tax Revenue)	LTR	CBSL
GOVT	Log (Capital Expenses to total public expenditure)	LPRGOV	CBSL
PV	Log (Gross Fixed Capital Formation)	LFCF	World Bank
HC	Working Age Population growth rate	WPOPGR	World Bank
TR	Trade Openness to GDP ratio	TROPEN	CBSL

This study would utilize an ARDL model to analyse the relationship among the considered variables. ARDL models have been used to explore the short-run and the long-run effects among macroeconomic variables in recent times. The Error

Correction Model (ECM) derived from the estimated ARDL model would integrate short-run dynamics to the long-run equilibrium. See Kwofie and Ansah (2018) and Fernando and Rajapakshe (2018). Furthermore, ARDL models are viable for identifying a long-run relationship despite the order of integration of the underlying variables. See: Bahmani-Oskooee and Ng (2002) and Nkoro and Uko (2016). Therefore, the empirical model of Equation 2 is specified as follows.

$$\Delta \ln Y_t = a_0 + \sum_{j=1}^{4} \beta_j \Delta \ln Y_{t-1} + \sum_{j=1}^{4} \Upsilon_j \Delta \ln TAX_{t-1} + \sum_{j=1}^{4} \delta_j \Delta X_t + \theta_1 \ln Y_{t-1} + \theta_2 TAX_{t-1} + \theta_3 X_t + \varepsilon_t \quad (3)$$

Short-run parameters to be estimated are βj, Υj and δj and long-run parameters to be estimated are $\theta 1$, $\theta 2$and $\theta 3$ while the error term of the model is εt. Other exogenous variables (GOVT, PV, HC, and TR) are represented by Xt.

Since the impact of taxation on economic growth can be analysed under two paradigms, the analysis primarily consisted of two parts. Initially, when considering the impact of tax level, we analysed annual data up to 58 years from 1960 to 2018. However, the Sri Lankan economy underwent economic liberalization in 1977, which caused a significant structural change. Therefore, in analysing the impact of tax levels, a subsequent analysis solely focusing on post-economic liberalization data to account for structural distortions was also conducted. We hope that the secondary analysis would enhance the reliability of the initial analysis on the impact of tax levels on economic growth. The hypotheses to be tested on analysing the impact of tax levels are as follows.

Tax Level Analysis 1 (1960-2018)

H1: Tax Level does not affect the economic output in the long-run.

H2: Tax Level does not affect the economic output in the short-run.

Tax Level Analysis 2 (1980-2018)

H3: Tax Level does not affect the economic output in the long-run under liberalized economic conditions.

H4: Tax Level does not affect the economic output in the short-run under liberalized economic conditions.

Considering the second paradigm of the study, in estimating the impact of tax structure on the economy, a third analysis consisting of data from 1980 to 2018 was conducted. In this analysis, we have considered only post-economic

liberalization data due to the inconsistencies seen in the tax classification before and after the economic liberalization in 1978.

In analysing the impact of tax structure, we separately calculated the effects of corporate income taxes (CIT) and personal income taxes (PIT). In addition, we have amalgamated the contribution of VAT and Excise Duties as taxes on the consumption of domestic goods and services (TDGS) as both can be considered as taxes on consumption. The impact of taxes on foreign trade (TFT) was also explored in this study. Other taxes were not considered due to the diverse and temporary nature of taxes it captures and its negligible contribution to the total tax revenue.

Therefore, to identify the impact of tax structure, we extended the specified ARDL model up to 4 more models (Equation 4 - CIT, Equation 5 – PIT, Equation 6 – TDGS, Equation 7 – TFT) to incorporate the contribution of individual taxes. As a control variable, for each model, we have deducted the specified tax revenue from the total tax revenue and incorporated it into the model (BT). This was done to avoid double counting the specified individual tax in incorporating tax revenue as a control variable. The empirical models estimated under the impact of tax structure and the key hypothesis tested for each model are shown below. Short-run parameters to be estimated are βj, Υj, $\mathrm{Q}j$, and δj and long-run parameters to be estimated are $\theta 1$, $\theta 2$, $\theta 3$ and $\theta 4$ while the error term of the model is εt. Xt represents other exogenous variables.

Corporate income taxes

$$\Delta \ln Yt = a_0 + \sum_{j=1}^{4} \beta j \Delta \ln Y_{t-1} + \sum_{j=1}^{4} \Upsilon j \Delta \ln CIT_{t-1} \sum_{j=1}^{4} \mathrm{Q}j \Delta \ln BT1_{t-1} + \sum_{j=1}^{4} \delta_j \Delta X_t + \theta_1 \ln Y_{t-1} + \theta_2 CIT_{t-1} + \theta_3 BT1_{t-1} + \theta_4 X_t + \varepsilon_t \quad (4)$$

H 5: CIT does not affect the economic output in the long-run.

H 6: CIT does not affect the economic output in the short-run.

Personal income taxes

$$\Delta \ln Yt = a_0 + \sum_{j=1}^{4} \beta j \Delta \ln Y_{t-1} + \sum_{j=1}^{4} \Upsilon j \Delta \ln PIT_{t-1} \sum_{j=1}^{4} \mathrm{Q}j \Delta \ln BT2_{t-1} + \sum_{j=1}^{4} \delta_j \Delta X_t + \theta_1 \ln Y_{t-1} + \theta_2 PIT_{t-1} + \theta_3 BT2_{t-1} + \theta_4 X_t + \varepsilon_t \quad (5)$$

H 7: PIT does not affect the economic output in the long-run.

H 8: PIT does not affect the economic output in the short-run.

Taxes on domestic goods and services

$$\Delta \ln Yt = a_0 + \sum_{j=1}^{4} \beta j \Delta \ln Y_{t-1} + \sum_{j=1}^{4} \Upsilon j \Delta \ln TDGS_{t-1} \sum_{j=1}^{4} \Omega j \Delta \ln BT3_{t-1} + \sum_{j=1}^{4} \delta_j \Delta X_t + \theta_1 \ln Y_{t-1} + \theta_2 TDGS_{t-1} + \theta_3 BT3_{t-1} + \theta_4 X_t + \varepsilon_t \quad (6)$$

H 9: TDGS does not affect the economic output in the long-run.

H 10: TDGS does not affect the economic output in the short-run.

Taxes on foreign trade

$$\Delta \ln Yt = a_0 + \sum_{j=1}^{4} \beta j \Delta \ln Y_{t-1} + \sum_{j=1}^{4} \Upsilon j \Delta \ln TFT_{t-1} \sum_{j=1}^{4} \Omega j \Delta \ln BT4_{t-1} + \sum_{j=1}^{4} \delta_j \Delta X_t + \theta_1 \ln Y_{t-1} + \theta_2 TFT_{t-1} + \theta_3 BT4_{t-1} + \theta_4 X_t + \varepsilon_t \quad (7)$$

H 11: TFT does not affect the economic output in the long-run.

H 12: TFT does not affect the economic output in the short-run.

Analysis and Findings

Impact of Tax Level on Economic Growth - Analysis 1 (1960-2018)

We confirmed the absence of multicollinearity and unit root through ADF and VIF tests, respectively (Table 2). We included maximum dependent lags of 4 when evaluating the long-term impact of taxes, based on the prior literature. (Ferede and Dahlby, 2012 and Romer and Romer, 2010). Dynamic Regressors were LGDP and LTR, where TROPEN, WPOPGR, LFCF, and LPRGOV were considered fixed regressors.

Table 2: Testing for Unit Root and Multicollinearity – Analysis 1 (1960-2018)

Variable	ADF Test Statistic		Order of Integration	Uncentred VIF
	Level	1st Difference		
LGDP	0.7982	-8.1147***	I (1)	
LTR	0.0877	-7.0011***	I (1)	1.6365
LPRGOV	-1.8707	-8.9242***	I (1)	1.3064
LFCF	-0.6186	-6.7347***	I (1)	2.0851
WPOPGR	-0.6215	-7.8287***	I (1)	1.0397
TROPEN	-1.5532	-6.5866***	I (1)	1.2184

***, **, and * implies the rejection of the null hypothesis of a presence of Unit Root at the significance level of 1%, 5%, and 10%, respectively.

A suitable model was selected based on the lowest Akaike Information Criteria, AIC (-2.0270). The significant negative error correction term and the sufficiently large bound test co-efficient suggests a long-run cointegrating relationship between the dynamic regressors and the dependant variable. Furthermore, the levels equation coefficient for tax revenue was positive and significant at 5% (Table 3). Hence, there is sufficient evidence to deduce that tax levels significantly and positively impact long-run economic growth in the Sri Lankan context.

Table 3: Analysis 1 (1960-2018)

Selected Model	(1,1)
Bound Test F-Statistic	10.5875***
Error Correction Term	-0.3807***
Long-run Form and Levels Equation Coefficients for explanatory variables	
LTR	0.3341**
Error Correction Form	
D (LTR)	-0.1161
TROPEN	-0.5643***
WPOPGR	-6.5643
LFCF	0.1298***
LPRGOV	-0.0835*

***, **, and * implies the rejection of the null hypothesis of no long-run relationship at the significance level of 1%, 5%, and 10%, respectively.

The stability of the parameters estimated was confirmed (Figure 4) through Cumulative Squares (CUSUM) and Cumulative Sum of Square tests (CUSUM of Squares).

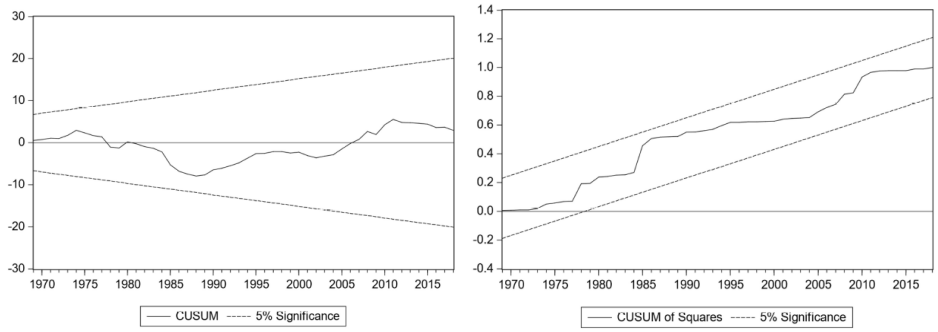

Figure 4 – Stability Diagnostics: Tax Level Analysis (1960-2018)

Source: Author prominent

Impact of Tax Level on Economic Growth - Analysis 2 (1980-2018)

Stationarity and multicollinearity were re-confirmed in the second part of the analysis (Table 4). A suitable model was selected based on the lowest AIC value (-2.8267). The significant negative error correction term and the sufficiently large bounds test statistic imply a long-run cointegrating relationship. The co-efficient for the tax levels was statistically significant at 1%. The established positive association was even stronger under post-economic liberalization conditions (Table 5).

Table 4: Testing for Unit Root and Multicollinearity – Analysis 2 (1980-2018)

Variable	ADF Test Statistic		**Order of Integration**	**Uncentered VIF**
	Level	**1st Difference**		
LGDP	-0.1768	-4.9495***	I (1)	
LPRGOV	-2.4737	-7.6582***	I (1)	1.3181
LFCF	0.6104	-4.8981***	I (1)	1.6959
WPOPGR	-1.4911	-6.7319***	I (1)	1.1255
TROPEN	-1.3580	-6.1114***	I (1)	1.1227
LTR	-1.1991	-5.3011***	I (1)	1.6197

***, **, and * implies the rejection of the null hypothesis of a presence of Unit Root at the significance level of 1%, 5%, and 10%, respectively.

Table 5: Analysis 2 (1980-2018)

Selected Model	(4,0)
Bound Test F-Statistic	12.5405***
Error Correction Term	-0.4835***
Long-run Form and Bound Test Coefficients for explanatory variables	
LTR	0.6127***
Error Correction Form	
LPRGOV	0.0691
WPOP_GR	-0.7188
LFCF	0.0615
TROPEN	-0.2651

***, **, and * implies the rejection of the null hypothesis of no long-run relationship at the significance level of 1%, 5%, and 10%, respectively.

Stability Diagnostics were re-confirmed through CUSUM and CUSUM of squares tests (Figure 5). For both models, a Jarque-Bera normality test was conducted. Next, Breusch-Godfrey LM test up to 4 lags was conducted to

ensure no serial correlation between error terms, and finally, a Breusch Pagan heteroskedasticity test was also conducted. Test statistics for each model are given in Table 6.

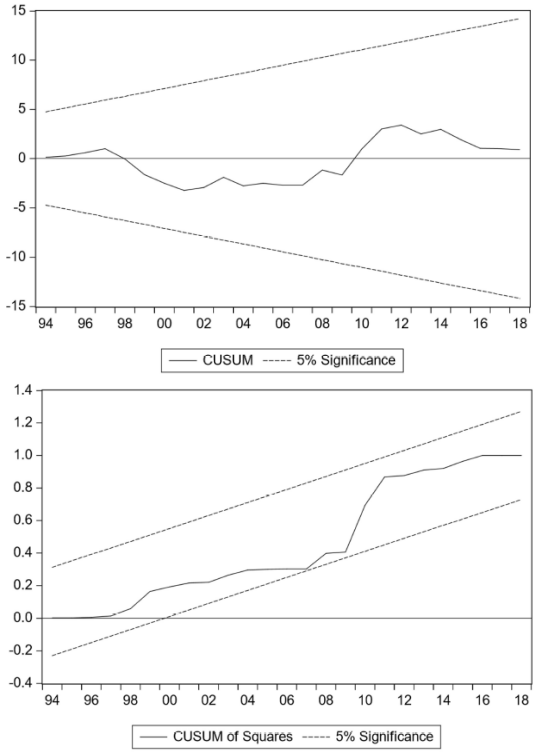

Figure 5 – Stability Diagnostics: Tax Level Analysis (1980-2018)

Source: Author prominent

Table 6: Diagnostics tests statistics – Analysis on Impact of tax levels

	Analysis 1	**Analysis 2**
Jarque-Bera normality test statistic	1.4530 (0.4836)	0.1605 (0.9229)
Breusch-Godfrey serial correlation LM test statistic	0.4058 (0.8035)	0.8641 (0.5015)
Breusch-Pagan-Godfrey heteroscedasticity F-test statistic	3.8255 (0.0046)	1.6806 (0.1467)

Note: Figures in the parenthesis indicate the probability value of the test statistics.

Impact of Tax Structure on economic growth

ADF tests were carried out to establish stationarity, and VIF tests were conducted to confirm the absence of multicollinearity. All models proved no multicollinearity and stationarity of data at 1st difference (Appendix 1). Separate four ARDL models were estimated for CIT (4), PIT (5), TDGS (6), and TFT (7). Bound Test Statistics were significant for all the models, and the error correction coefficients were highly significant and less than one, which confirmed a cointegrating relationship among the considered variables (Appendix 2).

All models were found to be stable, except for (7), which recorded an instability in the CUSUM of Squares test (Appendix 3). In addition, residual diagnostics for all models were confirmed except for (7), which was found not to be free from heteroskedasticity (Appendix 4). While personal income taxes and corporate income taxes were found to have a negative relationship with long-run economic growth, the nature of the relationship was insignificant. A short-run positive association was seen between taxes on domestic goods and services and economic growth. However, their distortionary impact too was deemed insignificant in the long-run. Taxes on foreign trade were found not to affect economic growth in the long-run and the short-run.

Discussion

Under both pre-and post-economic liberalization data, increased tax levels were deemed beneficial for the long-term economic growth. This was contrary to Kesavarjah's (2016) previous study, which found no association between the overall tax burden and economic output of Sri Lanka. However, this result is consistent with the findings of Mendoza et al. (1994) and Wang and Yip (1992). The subsequent study on tax structure determines a negative but insignificant association of corporate and personal income taxes to the long-run economic growth of Sri Lanka. This can be attributed to Jaimovich and Rebelo (2017) finding lower distortion of income taxes to the growth of a less developed economy. So, with economic development, we can expect such negative associations to be significant in the future, as suggested by Bania *et al.* (2007).

Consumption taxes (VAT and excise duties) were found to have a significant positive short-run impact and a statistically insignificant long-run negative impact. This positive influence of consumption taxes on economic growth

supports the findings of Ferede and Dahlby (2012), Arnold (2008), Arnold et al. (2011), and Szarowska (2013). It should be noted that the diagnostics checks performed on the model involving taxes on foreign trade were not found to be robust. Therefore, we are conservative on the interpretation of the impact of taxes on foreign trade on growth.

Conclusion

In this study, we analysed the impact of taxation on the economic growth of Sri Lanka. As highlighted in the literature, the impact of taxation on economic growth was analysed under two paradigms, tax structure and tax level, using a linear ARDL model. We found a positive impact of tax level on the short-run and long-run economic growth in Sri Lanka. In terms of tax structure, the expected negative impact, particularly to income taxes, was not significant. While the policymakers have re-iterated the need for an increase in direct taxes, our study suggests an opportunity to pursue such action. Also, for consumption taxes (VAT and excise duties), the long-run impact on economic growth was insignificant. Therefore, our study overwhelmingly suggests the possibility of increasing taxes in Sri Lanka. Raising taxes is a viable policy option in increasing government revenue without compromising the economy's growth potential. The tax ratio in Sri Lanka remains low and has decreased in the recent past. Under such scenarios, particularly with relatively lower direct taxes, it is reasonable to expect a non-distortionary effect of taxes on long-run economic growth. However, the impact of high tax ratios on economic growth and the threshold level of taxes needs to be further studied.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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APPENDIX 1

Unit Root and Multicollinearity Testing – Taxation Structure Analysis (1980-2018)

Variable	**ADF Test Statistic**		**Order of Integration**
	Level	**1st Difference**	
LGDP	-0.1768	-4.9495***	I (1)
LPRGOV	-2.4737	-7.6582***	I (1)
LFCF	0.6104	-4.8981***	I (1)
WPOPGR	-1.4911	-6.7319***	I (1)
TROPEN	-1.3580	-6.1114***	I (1)
CIT	0.0106	-6.6547***	I (1)
PIT	-1.8716	-7.3100***	I (1)
TDGS	-3.0987**	-5.3798***	I (0)
TFT	-0.0291	-5.6664***	I (1)
BT1	-1.4487	-5.7889***	I (1)
BT2	-1.1165	-5.2300***	I (1)
BT3	-0.5462	-5.5051***	I (1)
BT4	-2.5749	-4.6020***	I (1)

***, **, and * implies the rejection of the null hypothesis of a presence of Unit Root at the significance level of 1%, 5%, and 10% respectively.

APPENDIX 2

Selection of model and Estimated Outputs– Taxation Structure Analysis (1980-2018)

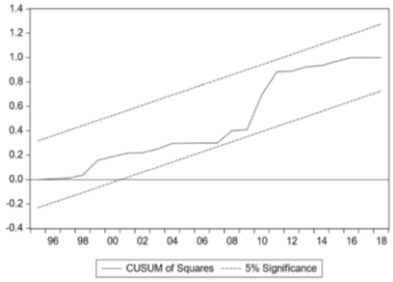
	CIT (4)	PIT (5)	TDGS (6)	TFT (7)
Bound Test Statistic	8.2760***	7.8309***	8.0961***	9.3309***
Error Correction Term	-0.4686***	-0.5340***	-0.5713***	-0.4652***
Long-run Form and Bound Test Coefficients for explanatory variables				
BT1	0.6526**			
BT2		0.4685		
BT3			0.6802***	
BT4				0.3292*
CIT	-0.0203			
PIT		-0.1119		
TDGS			-0.1200	
TFT				0.3954
Error Correction Form				
Coefficients for the explanatory variables				
D (BT2)		0.0591		
D (BT3)			0.1719**	
D (BT2 (-1))		-0.4104***		
D (BT3 (-1))			-0.1682**	
D (BT2 (-2))		-0.0836		
D (PIT)		-0.0879		
D (TDGS)			0.176878*	
D (PIT (-1))		0.0096		
D (PIT (-2))		0.1633**		
D (PIT (-3))		-0.0836*		
Other Exogenous Regressors				
TROPEN	-0.2348	-0.4704***	0.171520	0.0400
WPOPGR	0.6070	4.8576	-8.008406**	-4.3818
LFCF	0.0622	0.2932***	0.2043***	0.0097
LPRGOV	0.0989	-0.1847**	0.0461	0.1072

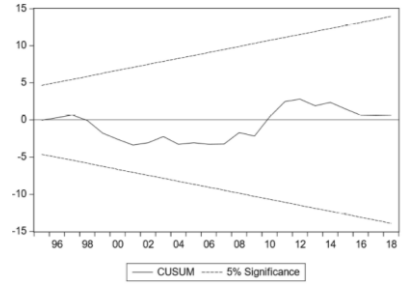
***, **, and * implies the rejection of the null hypothesis at the significance level of 1%, 5%, and 10%, respectively.

APPENDIX 3

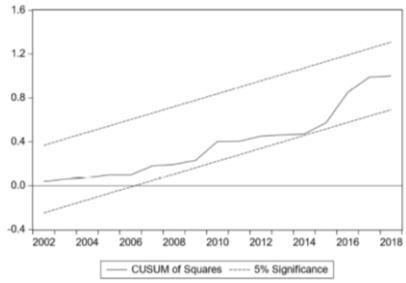
Stability Diagnostics: Taxation Structure Analysis 1980-2018

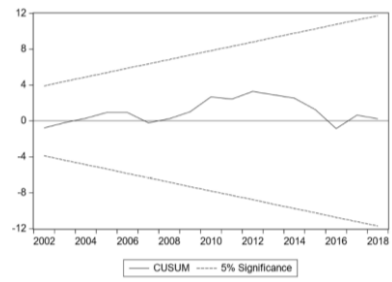
(4)



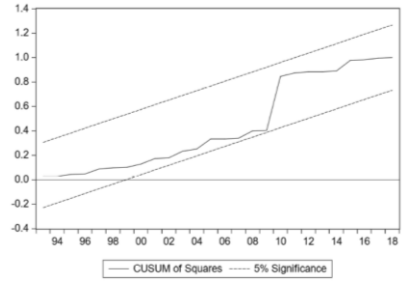


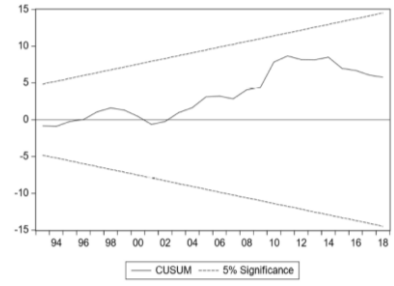
(5)



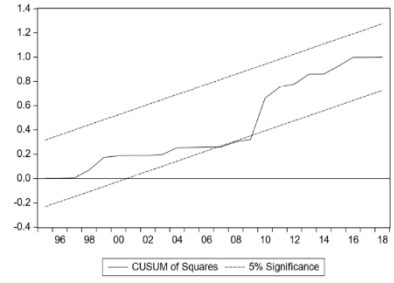


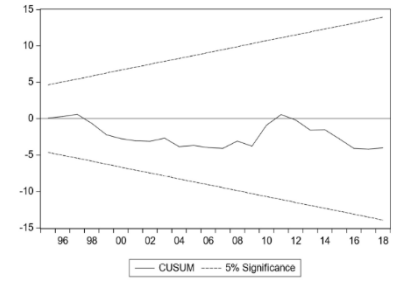
(6)





(7)





APPENDIX 4

Residual Diagnostics: Impact of Taxation Structure

	(4)	(5)	(6)	(7)
Jarque-Bera normality test statistic	0.0862 (0.9578)	1.7006 (0.4272)	0.7578 (0.6846)	1.2217 (0.5429)
Breusch-Godfrey serial correlation LM test statistic	1.0140 (0.4238)	2.3906 (0.1043)	1.0409 (0.4087)	1.9601 (0.1397)
Breusch-Pagan-Godfrey heteroscedasticity F-test statistic	1.7401 (0.1288)	0.8174 (0.6587)	1.2999 (0.2820)	2.7174 (0.0218)

Note: Figures in the parenthesis indicate the probability value of the test statistics.