THE EFFECT OF TAX COMPOSITION ON INCOME INEQUALITY: SRI LANKAN EXPERIENCE

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Abstract

The main purpose of this research paper is to identify the effect of tax composition and tax compliance among other variables on the income inequality in Sri Lanka. Taxes may affect income inequality depending on tax composition, progressivity and tax compliance. In the Sri Lankan context, the existing tax structure largely consists of indirect taxes and a higher level of tax non-compliance leading to a regressive tax system. Persistent high level income inequality and declining tax revenue buoyancy have been considerable issues experienced by the Sri Lanka government nearly over the last three decades that weakening fiscal operation and performance is an important empirical question to be addressed. This study adopts a time-series econometric method -- Johansen Cointegration and Vector Error Correction model to capture the long-run and dynamic relationships of selected variables. The data for the study were collected from Annual Reports and Economic and Social Statistics of Sri Lanka published by the Central Bank of Sri Lanka for the period of 1985 -2018. The key findings show a negative impact of direct taxes and a positive impact of indirect tax- VAT and tax non-compliance on income inequality. It suggests the necessity of broadening income tax base and strengthening tax compliance to reduce income inequality while improving buoyancy of tax revenues through best practices of taxation. Our findings provide more precise and feasible policy directives for the path to realize revenue-based fiscal consolidation with a more equitable and rationalized tax system in Sri Lanka. The impact on economic growth is not clear and left for future research.

Keywords*: Income Inequality, Tax Composition, Tax Non-compliance, Fiscal Policy, Direct Taxes, Indirect Taxes, Vector Error Correction Model*

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INTRODUCTION

Tax is an instrumental objective of fiscal policy. Conventional understanding is that taxes can be used to redistribute income and reduce inequality. Meanwhile, depending on the nature of the tax, it is differently felt as a tax burden by the taxpayer. The academic reflections in this regard have vastly focused on both statutory and economic incidence of taxes across different types of taxes. (e.g., tax composition and its effect on income distribution). Indirect taxes are generally regressive, while direct taxes are often progressive so that both types of taxes may lead to change in income distribution. Furthermore, tax composition affects net inequality in two ways: first, taxes have a different degree of progressiveness, and therefore tax composition is partly responsible for inequality. Second, tax composition affects economic incentives (e.g., labour market incentives, savings and investment), thereby it indirectly affects net inequality (Drucker, et al., 2017). Hence, the tax system is expected to play an important role for economic development and equity being a major part of fiscal operations.

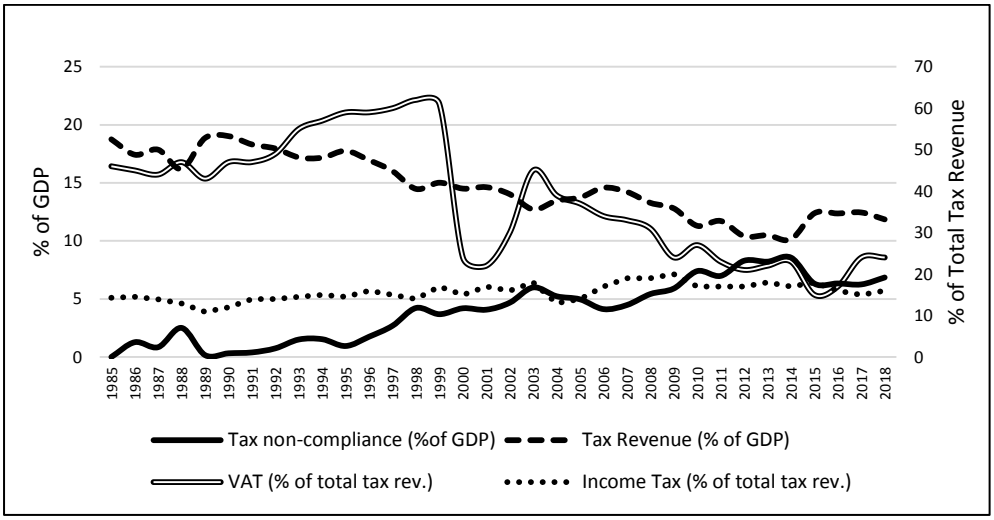
However, this aspect of taxation has been problematic over the last few decades in Sri Lanka as it does not deliver the potential tax revenue while maintaining a satisfactory level of tax compliance. In recent years, this issue in taxation has been focused with much debate among politicians, academic researchers, policy makers and practitioners. Nevertheless, each successive government faces this challenge that is detrimental to fiscal operation of the government, fairness of income distribution, efficiency and smooth economic stability.

Tax revenue in Sri Lanka largely consists of indirect taxes which accounts for about 82 percent of total tax revenue being the major source of financing public expenditures (CBSL, 2018). Direct taxes include personal income tax (PIT), pay-as-you-earn (PAYE) tax, corporate income tax and tax on interests. Moreover, taxes are levied by various regulatory authorities by virtue of the powers vested in them. According to the Inland Revenue Department (2018), income taxes amounted to 18 percent of the total tax revenue of the government, and indirect taxes on goods and services (VAT) amounted to 24 percent of the total tax revenue in 2018. Furthermore, income tax collection has been reduced by 7 percent, while indirect taxes have grown by a colossal 33 percent since 2015 (Ranasinghe, 2018). As it depicted in Figure 1, Sri Lanka has experienced declining of tax revenue as a percentage of GDP over the last three decades that has been closely associated with weaknesses of the tax structure and administration combined with various tax exemptions, tax avoidance and the non-compliance of taxes (Coomaraswamy, 2017).

According to the Figure 1, the non-compliance of taxes is in an increasing trend over the last three decades not only due to the weaknesses in the tax administration but also due to several other reasons such as growing informal sector businesses and

transactions, complexity in calculations and many discretionary tax measures in operation which lead to evade tax payments.

Figure 1: Tax Composition and Total Tax Revenue (1985 – 2018)



Source: Compiled by authors based on Annual Reports (various years), Central Bank of Sri Lanka. Colombo

The problematic aspect of the tax composition is clearly reflected from the tax incidence borne by each income category. For instance, the poorest 20 percent in the society pays as much as 13 percent and the poorest 10 percent pays as much as 23 percent of their income in the form of indirect taxes while the richest 10 percent pays less than 1 percent of their income as indirect taxes (Ranasinghe, 2018). This indicates that the tax system in Sri Lanka is highly regressive and more than 80 percent of total tax revenue is collected in the form of indirect taxes. Given that a larger share of the budget of low-income categories in the society is spent on essential consumption goods, the instrument is likely to increase and maintain persistently high-income inequality. Although this aspect of taxation is widely discussed and debated, still there are no clear insights, made by any systematic research, regarding the magnitude of the effect of tax composition and non-compliance on inequality for the consideration of much needed tax policy reforms to make Sri Lanka's tax system more equitable. Therefore, based on the above background information, we attempted to achieve the following two main objectives:

- To identify the effect of tax composition on income inequality in Sri Lanka, the magnitudes of which would provide important insights for tax policy reforms to streamline tax structure and to make it more equitable by adjusting the share of direct and indirect taxes appropriately.
- Declining of tax revenue in relation to GDP growth in the recent decades in Sri Lanka partly attributes to non-compliance of taxes which would in turn lead to make the tax system more regressive. Thus, there is a felt need of rationalizing tax

administration and fiscal operation of the government. We attempt to explore the insights into this anomaly by identifying the effect of non-compliance of taxes and real GDP among other factors on income inequality in Sri Lanka.

The remainder of this paper is structured by the reviews of theoretical background, which underpins the distributional effects of a tax system, and extant empirical research findings that directs to explore the knowledge gap in section 2. Section 3 presents data and methodology with an econometric approach. Section 4 presents the results and discussion and section 5 concludes the paper with some policy relevant implications.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

The theoretical underpinning of distributional effects of a tax system can be mainly explained by using tax incidence theory since the distribution of after-tax income is determined by the structure of the tax system and the level of tax in a country. "In a general way incidence theory is applied to distribution theory in which the focus is on how various tax regimes affect factor returns and commodity prices" (Mieszkowski, 1969: p. 1103). Under this theory, different aspects of effects are explained such as the incidence of partial commodity and factor taxes, interregional incidence, and dynamic incidence, and monopoly elements and incidence. With the evolution of empirical and theoretical work, an important development of the incidence analysis is that increasing use of general equilibrium techniques which provide a broader coverage for the analysis. However, the distributional effects of some taxes are ambiguous and not fairly straightforward due to the complexity of the impacts. Hence, scholars have followed tax incidence theory to explain the effects of taxes on income distribution under different circumstances considering different types of taxes.

Recently, the impact of tax composition on income inequality has gained interest among policy makers and academic researchers (Drucker, et. al., 2017; Adam, et. al., 2015; Chu, et. al., 2000). Among those, Drucker, et al., (2017) reveals that income taxes on individuals and non-recurrent property taxes are negatively correlated with inequality and economic growth; corporate tax impedes economic growth and has no clear impact on inequality; taxes on consumption increase both inequality and growth in developed countries.

Furthermore, fiscal policy reforms towards reliance more on indirect tax increase the income inequality causing income distribution to be more unequal in Latin America (Mahon and College, 2009; Amarante and Jiméne, 2016). A study on corporate tax shows that "statutory corporate income tax rates are strongly negatively associated with income inequality by controlling various other determinants of income distribution, while personal income tax rates have no impact on income inequality" (Immanuel, et al., 2012: p.1). However, progressivity of national income tax reduces inequality in observed income, but has a significantly smaller impact on actual inequality in selected

developed and developing countries (Duncan and Peter, 2016). Adam, et al., (2015) in their study on income inequality and the tax structure in relation to the evidence from developed and developing countries show that more unequal economies rely heavier on capital relative to labour income taxation. This relationship remains robust across various alternative measures of income inequality and most importantly through alternative political regimes. Moreover, tax-based consolidations reduce both market and disposable income inequality, but at the cost of a decrease in output in the short to medium run (Ciminelli, et al., 2017). Meanwhile, taxation has influenced the evolution of inequality in Latin America. In particular, it shows that both tax level and tax composition matter as determinants of income inequality. Income taxation influences the distribution mainly by reducing the distance between the middle class and the upper class. However, the effect is limited at the top of the distribution (Martorano, 2018). Likewise, another study conducted by Martinez-Vazquez, et al., (2012) revealed that progressive personal income taxes and corporate income taxes reduce income inequality in selected developed, developing and transition countries, but the effect of corporate income taxes is eroded away with the degree of globalization or openness. Also, it is demonstrated that indirect taxes adversely effect on income distribution.

The general consensus among welfare economists on increasing direct taxes such as income tax and property taxes would lead to reduced income inequality seems to be an obscure and a debatable fact. Evidence shows that a statistical test finds no meaningful relationship between progressivity and reduction of at-risk-of-poverty income inequality in European countries implying that it is impossible to find a clear and unambiguous relationship between progressivity of income tax and income inequality (Šilėnas, 2015). As Chu, et al., (2000) point out, tax policies in industrial countries reduce their Gini coefficients much more than their counterparts in developing countries. Therefore, it implies that developing countries could not use tax and transfer policies effectively to mitigate income inequality. By considering selected developed and developing countries, Lee (2005) shows that the state is more inclined to support the development of particular core industries or client populations in urban formal sectors through targeted taxation or transfer programs so that public sector expansion may translate into worse distributional outcomes in non- democracies or limited democracies. Based on the economy of the United States, Poterba (2007), shows that there are two main effects of tax policy on income distribution. The first involves the redistributive impact of taxes for a given pre-tax distribution of income and the second involves changes in the pre-tax distribution of income that are induced by taxpayers' behavioural responses to the tax system. Tax system, particularly with direct tax on wealth, has an important place in dealing with inequality that is a major concern in the policy making process (Auerbach and Hassett, 2015).

According to the Indonesian experience, the total consumption taxes cause the inequality to increase marginally. In particular, the larger of the taxes (VAT) has a

positive marginal impact on inequality, implying that the existing indirect tax system intensifies the issue of inequality. However, the smaller tobacco excise has a negative marginal impact on inequality in Indonesia (Jellema, et al., 2017). The structural changes in income inequality across states and territories in Australia is linked to different factors including favourable changes in tax policies, indicating that both state and federal governments play a crucial role in moderating income inequality. It is evident that raising income inequality has been addressed through income transfers to low-income earners, a mildly progressive tax system -- raising more tax in proportion to income from high-income earners than low- or middle-income earners (Ivanovski, et al., 2019).

Similarly, in advanced OECD economies, tax-based consolidations reduce income inequality, but at the cost of weaker economic activity. This implies that tax composition is a main factor in determining the intensity of the impact on inequality. As such, it is found that indirect taxes reduce income inequality by more than direct taxes possibly due to the operation of a positive labour supply channel. Agents in the labour markets are induced to increase their labour supply due to the incentives created by the higher prices of consumption basket through higher indirect taxes, leading to generate positive effects on the income distribution. This scenario particularly prevails among middle-aged women. In addition, personal income taxes affect the income inequality negatively, indicating that imposing taxes on individuals' income can increase the level of equal distribution of income without having significant negative effects on labour force participation (Gerber, et al., 2019; Gabriele, et al., 2019).

In the Sri Lankan context, the current tax system has encountered issues particularly, with low levels of tax revenue, securing a fair income distribution and tax compliance. Tax compliance is determined not only by tax policy as such, but also by other factors such as the taxpayer's image of the government, the perceived equity and fairness of the tax system, social attitudes to taxation and the level of effectiveness of the administration as well. To handle these problems effectively, as suggested by (Amirthalingam, 2013), the country should follow measures such as broadening the tax base, simplifying the tax rates and tax laws, reducing the numbers of taxes, facilitating voluntary compliance, improving tax administration, providing incentives to genuine taxpayers and tax officials. Meanwhile, Kesavarajah (2016) reveals that the higher level of income taxes, import taxes and other taxes affect negatively to the output growth, while domestic consumption tax (VAT) shows a significant positive impact on long term output growth. However, there is no clear direction as to how the current system of tax structure and composition effect income inequality.

Thus, empirical evidence on how tax composition affects income inequality varies depending on country specific factors as well. In particular, the tax composition is an influential factor in determining the income distribution in a country/region, where the governments' intervention is substantial, since imposing taxes has an incidence on the

taxpayers. However, the effects of tax compositions show mixed results by empirical findings and it mainly implies that direct and indirect taxes have negative, positive or neutral impacts on the income distribution depending on its context, However, a significant effect of the progressive tax system (direct taxes) or regressive tax system (indirect taxes) appears in mitigating/intensifying the level of unequal income distribution. As such, empirical evidence underpins the prevailing negative impact of direct taxes (e.g. personal income taxes) and positive impact of indirect taxes (e.g. taxes on consumption – VAT) on the income inequality with contextual differentiations; contrariwise this impact is different in some contexts, and even neutral with the effect of other-related factors such as labour market behaviours, resulting in ambiguous linkages. Therefore, investigating the empirical relationship between tax composition and income inequality pertaining to the Sri Lankan context is important in order to recommend clear policy directions to reduce the level of income inequality through robust tax policies.

It is evident from the literature review that there is a dearth of systematic research on the tax system and its effect on income inequality in the Sri Lankan context. Hence, identifying this relationship and its effect would explore important insights into the reasons for high- and persistent-income inequality in Sri Lanka over many decades. Currently, it does not seem to be socially justifiable when compared with the standards of South Asian countries. For instance, according to the World Population Review - Gini Index by 2020, the Index for South Asian countries are India 35.2, Pakistan 30.7 and Bangladesh 32.1 whereas Sri Lanka's is 39.2 being far from the South Asian regional income distribution standards.

Thus, high income inequality, as an indication of underdevelopment, should be examined for understanding the extent to which the tax policy in Sri Lanka has been contributed to make it high and persistent. If the results of this study uncover such a link, rationalizing the tax composition, broadening the tax bases and making the tax system simple, fair and efficient would be required to correct it. Hence, this research intends to fill that research gap by examining the effect of tax composition and tax non-compliance among other variables on the inequality of income in Sri Lanka.

DATA AND METHODOLOGY

Hypotheses

In line with the objectives of this research study, four null hypotheses can be set up for testing in the econometric model selected for this study as follows:

H_{01}: Income tax does not affect the income inequality

H_{02}: VAT does not affect the income inequality

H_{03}: Import duties do not affect the income inequality

H_{04}: Tax non-compliance and real GDP do not affect the income inequality

Since there are three types of taxes; income tax, VAT and import duties are included as tax composition, impact of each tax variable on income inequality is estimated, thereby testing the H_{01}, H_{02} and H_{03} hypotheses respectively. Mainly, the impact of each independent variable on the dependent variable is estimated as a long-run effect. As the next step, the existence of the dynamic relationships (long-run equilibrium and short-run relationships) is examined.

Data and Sources

This study uses annual time-series data for the period 1985-2018. The data were extracted from Annual Reports and Economic and Social Statistics of Sri Lanka, Central Bank of Sri Lanka for various years.

Model Specification and Estimation

This study adopts Johansen cointegration and Vector Error Correction model to capture the long-run and dynamic relationships of selected variables as in equations (1) and (2).

$$\mathrm{GINI_t} = \beta_0 + \beta_1 \mathrm{ITX_t} + \beta_2 \mathrm{VAT_t} + \beta_3 \mathrm{ID_t} + \beta_4 \mathrm{TNC_t} + \beta_5 \mathrm{LNRGDP_t} + \mathrm{u_t} \quad \ldots\ldots\ldots\ldots \quad (1)$$

$$\mathrm{GINI_t} = \beta_0 - \beta_1 \mathrm{ITX_t} + \beta_2 \mathrm{VAT_t} + \beta_3 \mathrm{ID_t} + \beta_4 \mathrm{TNC_t} + \beta_5 \mathrm{LNRGDP_t}$$
$$\rightarrow (\text{Eq. 1 with hypothesized coef. signs}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where; variables GINI, ITX, VAT, ID, TNC and LNRGDP in equation (1) denote that Gini index (represents the income inequality), income tax, value added tax or goods and services tax and import duties which are presented as a percentage of the total tax revenue, tax non-compliance (the difference between potential tax revenue and actual tax revenue -- LKR Million) and logarithm of real GDP respectively. The u is the white noise error term; t is the time period (1985-2018); Gini index of household income values (coefficients) are multiplied by 100 to express it as a percentage. Moreover, with the introduction of VAT in 2002, GST was replaced with VAT for the consistency of data considered in the model. The variables which represent the tax composition in Sri Lanka, namely ITX, VAT and ID were selected based on a previous study conducted by Kesavarajah (2016). We hypothesized that ITX to be negatively related with income inequality whereas VAT and ID to be positively related with income inequality due to the regressivity of indirect taxes. TNC and LNRGDP are the newly added variables which can have an impact on the inequality, especially following the Kuznets hypothesis which observes that possible positive relationship between GDP growth and income inequality (first stage of the inverted U shape curve) in underdeveloped and developing countries (Todaro and Stephen, 2012). Also, tax non-compliance is mostly resulted by weaknesses in tax administration and structural problems in the tax system. Since this study adopts a time-series analysis, time period and number of observations are a matter of concerning. The study uses a data set containing annual data for 34 years, which is reasonably sufficient for the analysis. However, it is noted that the time period is constrained by availability of required data (e.g., data on Gini index and tax

composition). More specifically, only three variables (ITX, VAT, ID) are selected to represent the tax composition which consists of both direct and indirect taxes, while existing other types of taxes are not considered due to the unavailability of consistent data for the whole period, and taxes are imposed depending on the volume, which might not reflect the impact on the income distribution properly (e.g., excise duties).

As most time-series are non-stationary, spurious regression problem exists at most of the time. In order to avoid this problem, it has become a standard practice to begin the analysis with prior determination of unvaried properties of the time-series (Khan and Gill, 2009). A long run relationship can exist when series follow the same order of integration. Moreover, a combination of stationary series can be identified from a non-stationary series through co-integrating techniques. Tests which are related to co-integration mainly involve two steps, namely identifying the presence of non-stationary (unit root) and long-run relationship between variables.

In order to identify the existence of non-stationarity or unit root, some standard unit root tests can be followed such as Augmented Dickey- Fuller (ADF) test, Phillips-Perron (PP) test and Kwaitkowski-Phillps-Schmidt-Shin (KPSS) test. This study used ADF and PP unit root tests. The general ADF test used is shown in equation (3).

$$\Delta X_t = \mu + \beta X_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta X_{t-j} + \varepsilon_t \quad \ldots\ldots (3)$$

A co-integration test should be employed to ensure that a group of non-stationary series is co-integrated and the presence of a long run relationship. This study employed a VAR (Vector Auto Regressive) based cointegration tests using the methodology developed by Johansen (1991, 1995).

A VAR of order p can be written as follows in equation (4).

$$Y_t = A_0 + A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + \mathrm{B}' \mathrm{X}_t + \varepsilon_t \quad \ldots\ldots (4)$$

Where, Y_t is a k vector of non-stationary I (1) variables, X_t is a d-vector of deterministic variables, and ε_t is a vector of innovations.

For the purpose of finding out the short -run relationship between variables and long run equilibrium of the variables, Error correction model is employed. The tests which are related to co-integration mainly involve two steps namely identifying the presence of non-stationary (unit root) and long-run relationship between variables. As most time-series are non-stationary, spurious regression problems exist most of time and so that this problem should be avoided by employing proper unit root tests.

This study uses ADF and PP unit root tests in order to identify the existence of non-stationary or unit root. Next, Johansen cointegration is adopted to ensure whether a long-run relationship exists when series follow the same order of integration.

For finding out the short-run relationship between variables and long run equilibrium of the variables, Error Correction Model can be employed as given in equation (5).

$$\Delta Y_t = \alpha_t + \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Phi_i^* \Delta Y_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where, Π = αβ′; where α is coefficient of error correction term, β′; (1 × 6) Vector of cointegrating coefficients, Yt = [$GINI_t$, ITX_t, VAT_t, ID_t, TNC_t, $LNRGDP_t$] ′ vector of endogenous variables, Y_{t-1} is the lagged value of variables and ε_t is the white noise error term.

RESULTS AND DISCUSSION

Table 1 gives the descriptive statistics of each variable, which describe the basic features of the sample.

Table 1: Descriptive Statistics

	GINI	ITX	VAT	ID	TNC*	RGDP
Mean	46.00	15.63	38.12	16.54	239387.50	1274550.00
Median	46.00	15.50	38.00	14.55	65658.00	973256.00
Maximum	49.00	20.00	62.00	31.40	989819.10	2846155.00
Minimum	43.00	10.90	15.00	5.00	0.00	478982.30
Std. Dev.	1.65	2.08	14.55	8.10	322045.50	752693.20
Skewness	-0.20	-0.02	0.15	0.39	1.14	0.83
Kurtosis	2.95	2.60	1.71	1.85	2.71	2.32
Observations	34	34	34	34	34	34

Note: GINI – Gini index of household income values (coefficients are multiplied by 100), ITX, VAT, ID -- income tax, value added tax or goods and services tax and import duties respectively, given as a percentage of the total tax revenue, TNC-- tax non-compliance (the difference between potential tax revenue and actual tax revenue -- LKR Million, RGDP – GDP (LKR Million) in real term

**As per the calculations, there is no difference between actual tax revenue and potential tax revenue in base year (1985).*

Source: Authors’ estimations based on Annual Reports and Economic and Statistics – Sri Lanka, Central Bank of Sri Lanka (Various Issues)

Table 2: Results of Unit Root Tests (ADF and PP – Trend and Intercept)

Variables	Level	Level	1st Difference	1st Difference
	ADF	PP	ADF	PP
GINI	0.3295	0.3017	0.0024*	0.0026*
VAT	0.2136	0.6545	0.0027*	0.0000*
ID	0.1834	0.2256	0.0000*	0.0000*
ITX	0.1086	0.1057	0.0000*	0.0000*
TNC	0.2147	0.8898	0.0041*	0.0060*
LNRGDP	0.9148	0.7286	0.0000*	0.0000*

*Note: * indicates 1 percent significance level and probability values are given in the table*

Source: Authors' estimations

ADF and PP unit root tests were carried out to identify the order of relevant variables as a prerequisite for cointegration test. Results of these tests show that all variables in the model are not stationary at level, but stationary at their first difference ensuring that variables are integrated in order [1(1)] (see Table 2). This requirement fulfils employing the Johansen cointegration test to identify the long-run relationship between the dependent variable and the independent variables of the model.

However, before proceeding with this estimation, it is required to conduct diagnostic tests as a pre-requisite for accurate estimations so that the main procedure of the data analysis is followed by these diagnostics tests and the results are in Table 3.

Table 3: Results Diagnostics Tests

Test	Probability
Serial Correlation (BG LM test)	0.8348
Ramsey RESET test	0.1315
Heteroskedasticity test (BPG)	0.1317

Note: H_0 is not rejected at 5 percent significance level

Source: Authors' estimations

Results of diagnostic tests namely Breusch-Godfrey Serial Correlation LM Test, Ramsey RESET Test and Breusch-Pagan-Godfrey confirm that residuals are not serially correlated. Hence no specification error in the estimated model and disturbance term in the equation is homoscedastic respectively. Meanwhile, with regard to recursive estimates, CUSUM plot lies within the upper and lower critical bound at 5 percent significance level ensuring the stability of parameters.

The next step of the estimation is to identify the optimal lag length using lag length selection criteria; LR, FPE, AIC, SC and HQ. In this study, optimal lag length selection is based on the SC criterion which is shown in Table 4.

Table 4: Results of optimal lag length selection

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-93.49	NA	7.20e+12	46.63	46.91	46.72
1	-559.01	206.2*	1.07e+10	40.06	42.02*	40.69*
2	-516.83	47.79	9.71e+09*	39.65*	43.29	40.82

**indicates lag order selected by the criterion*

Source: Authors' estimations

As one cointegrating relation can be identified in the system of equation at 5 percent level of significance based on the trace statistics, it is indicated that there is a long run relationship between variables, and it was obtained by employing Johansen co-integrating test (see Table 5).

Table 5: Results of Johansen Cointegration Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.774797	114.5347	95.75366	0.0014
At most 1	0.584835	69.81221	69.81889	0.0501
At most 2	0.495800	43.43987	47.85613	0.1222
At most 3	0.362729	22.89637	29.79707	0.2512
At most 4	0.248294	9.379565	15.49471	0.3314
At most 5	0.026874	0.817262	3.841466	0.3660

Trace test indicates 1 cointegrating eqn. (s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Source: Authors' estimations

Long-run relationship is shown in equation (6).

$$\text{GINI} = 45.68665 - 0.864771\text{ITX}^{*} + 0.019307\text{VAT}^{**} + 0.111536\text{ID} + 1.205\text{TNC}^{*} + 11.32254\text{LNRGDP}^{*} \quad \ldots\ldots (6)$$

[- 4.27161] [1.95089] [1.10008] [4.84589] [4.18968]

*Note: *, **, *** show significant at 1 percent, 5 percent and 10 percent level respectively. t-statistics are given in parenthesis*

As per the results shown in equation (6), three null hypotheses are rejected of which H_{01}, H_{04} are rejected at 1 percent level and H_{02}, is rejected at 5 percent level, whereas H_{03} is not rejected indicating that import duties not being statistically significant as a variable but it has got the expected sign implying positive association of income inequality with import duties. As shown in equation (6), VAT, LNRGDP and TNC affect the income inequality positively, while ITX negatively affects in the long-run. In line with the objective of the study, tax composition is identified as an influential factor that affects income inequality in the long-run. As income tax negatively affects income inequality, this kind of direct taxes can be used to address the income distribution problem along with enhancing tax revenue. For instance, according to estimation results, 1 percent increase in the income tax will reduce the Gini index by 0.86 percent, with higher statistical precision. However, VAT affects the income inequality positively implying that tax on consumption goods adversely affects the income distribution of the country. This means that the households with relatively low-income categories will have to pay a greater percentage out of their income on tax which is a regressive effect as disposable income decreases disproportionately for low-income categories. As income tax negatively affects the income inequality, it can be used to minimize the income distribution problem along with broadening the tax base and streamlining tax administration with international best practices to raise tax revenue. These results are consistent with the findings of studies conducted by Mahon and College (2009), which confirm that indirect taxation intensifies the unequal income distribution, while Martorano (2018) reveals that income taxation reduces income gap among different income groups. However, these findings are not drawn by being on an in-depth times-series analysis, therefore our research and its findings with higher statistical precision fill the existing research gap of quantitative estimations helpful for tax policy reforms.

Moreover, real GDP positively affects the income inequality in the long-run implying the concept of Kuznets curve which explains the association of GDP growth of per capita income and inequality of income which is positive for underdeveloped and developing countries like Sri Lanka. Also, according to our estimation results, tax non-compliance affects positively in the long-run resulting in an increase in income inequality by 1.2 percent as a result of an increase in tax non-compliance by one unit. This implies that tax non-compliance intensifies the income inequality or tax compliance which can mitigate the issue of income inequality substantially so that when the gap between potential and actual tax revenue is greater it leads to a situation of a higher degree of tax non-compliance resulting in a higher income inequality in the society. This means tax non-compliance is a significant factor as a determinant of income inequality. Hence, tax administration, tax rules and simplification of the tax system need to be aligned with improving the rate of tax compliance for making the income distribution fairer.

Next, Vector Error Correction Model (VECM) was employed in order to find out the long-run equilibrium or Speed of Adjustment (see Table 6) and the short-run relationship.

Table 6: Long-run Equilibrium

Error Correction:	D(GINI)
CointEq1	-0.741379* [-2.64311]

*Note: *1 percent significance level, t-statistic values are given in the parentheses*

Source: Authors' calculations

According to the results, the error correction term is significant and shows the expected sign to bring to the long-run equilibrium at the speed of adjustment implying there is long-run equilibrium in the model. This means that 0.74 percent of equilibrium error is corrected for each year and the response variable (income inequality) moves towards the long-run equilibrium path. Moreover, all independent variables in the model do not affect income inequality in the short-run implying that there is no instance response of income inequality for the changes in the independent variables (see Table 7).

Table 7: Short-run Relationship

D(ITX (-1))	D(VAT (-1))	D(ID (-1))	D(TNC(-1))	D (LNRGDP (-1))
-0.97811	0.04287	0.06356	0.91363	4.17683
[-0.83564]	[1.31862]	[1.04016]	[0.38313]	[1.21216]

Note: t-statistic values are given in the parentheses

Source: Authors' calculations

Furthermore, the results of this study shed some lights on necessary aspects for policy makers to draw attention on tax policy reforms. Although VAT remains as a main contributor to the government revenue, the current tax rate of 15 percent is high by South Asian countries standards. The tax policy and composition of taxes heavily depend on indirect taxes focusing on essential consumption goods for raising revenues with low cost of tax collection and administration. Hence, the current tax system seems appealing when the tax administration is weak, extreme in complexity and loosely defined fiscal management has resulted in many distortions, corruptions and irregularities. However, the consumption expenditure for low-income categories remains at high percentage out of their total income. This situation may also cause a weakening consumer demand for consumption due to low affordability and increasing income inequality. Thus, managing the fiscal operation is becoming extremely difficult due to the small size of the economy (GDP is 88 US $ billion - current market prices -in

2018) with low economic growth. Furthermore, the government of Sri Lanka is a welfare state that spends substantially on education, health, subsidies and poverty alleviation programs. Therefore, improving fiscal operation of the government may indirectly benefit ordinary and poor segments of the society which in turn affects reducing income inequality. Therefore, remedial measures are broadening the income tax base and improving tax compliance, while reducing or (exempt) VAT for (essential) consumption and intermediary goods to stimulate the consumption and investment expenditures. For instance, China has fully implemented its VAT reforms appropriately since 2016 by introducing varying tax rates selectively for different tiers, broadening the tax base with a transparent and efficient tax system which has improved tax compliance. Therefore, the contribution to total tax revenue is high from VAT (around 46 percent even though tax rates are relatively lower than many other countries in the region (State Taxation Administration Annual Report, 2018).

Thus, empirical findings of this study fill the existing knowledge gap by identifying and measuring the substantial effects of tax composition and tax non-compliance on income inequality in the Sri Lankan context. It becomes conducive for policy reforms of which the focus would be increasing tax revenue while mitigating the issues of income redistribution. Moreover, the findings relating to tax composition are consistent with the empirical evidence regardless of some differences on the contextual basis. As such, negative effects from direct taxes and positive effects from the indirect taxes on income inequality are evident in the current academic discourses (Martorano, 2018; Jellema, et al., 2017; Amarante and Jiméne, 2016; Martinez-Vazquez, et. al., 2012; Mahon and College, 2009), indicating the consistency of the results of our study.

CONCLUSION AND POLICY RECOMMENDATIONS

The results of this study explore and develop the insights of the complex link between tax composition, tax non-compliance and income inequality. The findings of the study show a mix result with regard to tax composition that mainly consisted of negative impact of income tax and positive impact of VAT on income inequality in the long-run. Along with this, the study identified that tax non-compliance and logarithm of real GDP affects positively on income inequality as long-term effects in Sri Lanka. However, import duties are not statistically significant although it shows the hypothesized coefficient sign. This implies that income distribution is not sensitive to the changes in import duties substantially due to its nature of the imposition.

Based on the findings of the research, some policy recommendations can be made for the consideration of increasing tax revenues and minimizing persistent high-income inequality in Sri Lanka. The tax policy should not merely target achieving the required or estimated tax revenue regardless of the fairness of the incidence of taxes to make it less regressive. In order to achieve the results of our recommendations, structural reforms to tax composition, for example, 60 percent to 40 percent balance between

indirect and direct taxes respectively which is already suggested by Inland Revenue Act (IRA) in 2017 with the view of improving tax compliance, simplifying and broadening the tax base of the direct taxes, strengthening best practices of tax administration are the necessary measures to be taken. Furthermore, removing excessive tax incentives and modernizing rules related to cross-border transactions to address base erosion and combat tax avoidance and strengthening and clarifying existing powers of the Inland revenue Department (IRD) to improve enforcement are some of the institutional and administrative measures can be taken to improve tax compliance. In addition, Sri Lanka may need to be benchmarked to international best practices for improving the tax administration, fiscal management, while introducing reforms to tax composition vital for reducing income inequality. However, the trade-off between the government's objectives of revenue generation and income redistribution needs to be taken into consideration in this regard. The less focus on income redistribution by the existing regressive tax system requires making reforms in the tax system – moving towards a progressive tax system, thereby minimizing the collision between these two objectives.

Finally, we explore areas for further research along the effect of tax policy reforms suggested by this study aiming to increase tax revenues with less regressive tax composition on economic growth. Furthermore, this research can also be extended to measure the effect of our tax policy variables on different age groups of the population channel through labour market effect on income inequality and how they may react differently to tax rates and tax composition changes recommended by this study and introduced by the new Inland Revenue Act in 2017 as well.

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