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Macroeconomic Determinants of Income Inequality in Sri Lanka

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Abstract

The aim of this paper is to identify the macroeconomic determinants of income inequality of Sri Lanka, as it appears high in the country for the last five decades. The analysis is done using secondary data from 1978 to 2019. Autoregressive Distributed Lag model (ARDL) is utilized as the main estimation technique. Findings indicate that government expenditure, trade openness, average prices, agricultural share to the GDP, and per capita GDP are the main macroeconomic determinants of income inequality in Sri Lanka among the chosen variables. Moreover, the results reveal that government expenditure and trade openness seemingly induce income inequality, confirming Barro's hypothesis, while average price level and the share of agriculture to the GDP have contributed reducing income inequality of the country. Per capita GDP also shows a marginal significance, and it supports Kuznets' view. The study suggested that policy priority should be given to develop the agricultural sector and to catches the spillover effect of international trade to reduce income inequality. Maintaining a stable price level is also prominent.

Key words: ARDL model, income inequality, openness, trade spillover
JEL code: C32, D63, E60

1. Introduction

Income inequality has been a persistent phenomenon in Sri Lanka for the last five decades even though successive governments have implemented various income redistribution schemes aimed at reducing income inequality. Income inequality measured by the Gini coefficient was 0.51 in 2018 revealing a high level of inequality in Sri Lanka. The fact that Gini coefficient was 0.48 in urban areas, 0.44 in rural areas, and 0.36 in estate sector indicate the sectoral disparities of income inequality in the country (Department of Census and Statistics (DCS), 2017). The level of income inequality in

urban areas of Sri Lanka, especially in Colombo district, is five times higher than that of other districts. As shown in recent studies, the 'richest group' in the Colombo district enjoys 72.9 percent of the district's total household income. More than 41 percent of the households in this district are in the 'richest group' with a monthly average income of Rs. 81,372 or more (Nanayakkara, 2018). Internal migration and skill mismatch have been recognized as some of the reasons for this situation. As stressed by this research, income inequality in rural areas is also quite high and it is attributed to inadequacy of job opportunities, low attention given to agricultural sector, lack of infrastructure facilities to connect with urban industrial centers, and low level of female labor force participation (female labour force participation in the rural sector is only 36 percent).

The concept of 'Inequality' in a sense describes disparities in income, assets and wealth distribution among communities or individuals. This can be described in terms of opportunities, abilities, and spatiality. High level of income inequality tends to slow down the process of human and physical capital accumulation (Gallo, 2002). A possible relationship between income inequality and economic growth was first conceptualized by Kuznets (1955) emphasizing that when a country's per capita income increases, its inequality first worsens and then improves. His thesis made clear that when a country is in preindustrial stage initially, everybody is equally poor with low income. However, when the country experiences industrialization, people with potentials tend to earn more creating an income gap in the society.

This has become a common phenomenon in many countries regardless of the level of development at present. As mentioned in the study of Allison et al. (2014), during the past three decades, rise in income inequality in developing countries and OECD countries indicated that 10 percent of population in OECD has earned incomes of 10 times greater than that of the poorest 10 percent in developing countries. The richest 10 percent earned seven times higher than the poorest 10 percent. Based on these scenarios, Piketty (2014) has challenged the popular Kuznets curve emphasizing that countries tend to experience income inequality even after they have reached advanced stage of development. He further stressed that the inverted 'U' shape curve no longer exists, instead a 'S' curve can be observed.

As previously discussed, sectoral income inequality is high in Sri Lanka (Table 1). As shows in Household Income and Expenditure Survey (HIES) 2016 report, though poverty headcount index has declined from 6.7 percent in 2012 to 4.1 percent in 2016, inequality remains quite high (Gini coefficient was 0.48 in 2012 and 0.45 in 2016)[1]. Over the years, a significant difference in Gini coefficient cannot be observed in all three sectors in Sri Lanka. Estate sector maintains

low-income inequality as almost all in the estate sector shares equal earnings and other related assets. However, when it comes to the urban sector and the rural sector, income differences are significantly high in which formal sector employees earn more than informal sector workers. Consumption of goods and services vary with employment status of urban and rural households as well as between formal and informal sectors. It can be observed that income differences in rural and urban sectors are higher than that of estate sector.

Table 1: Gini coefficient in Sri Lanka (by sectors)

Sector	2016	2012/13	2009/10
Sri Lanka	0.45	0.48	0.49
Urban	0.48	0.51	0.48
Rural	0.44	0.45	0.49
Estate	0.36	0.39	0.43

Source: HIES-2016, Department of Census and Statistics, 2017

Compared to the other Asian counterparts, income inequality in Sri Lanka was lower in 2019 (Figure 1). Income inequality in India (0.83) and Indonesia (0.83) have been significantly high compared to other Asian countries. Among the South Asian countries, Nepal and Bangladesh have recorded high levels of income inequality. Income inequality in Sri Lanka has been the lowest within the South Asian region.

The quantile distribution of income can also be used to better understand the income inequality in Sri Lanka. The highest 10 percent of the population shared 32.9 percent of total income in 2016 while the lowest 10 percent of the population shared 2.9 percent in the same year. Further, the highest 20 percent of the population shared 47.6 of total income in 2016 while the recorded minimum was 41 percent in 1985. The lowest 20 percent of the population shared only a 7 percent of income in 2016 which has not changed much over the years which has remained below 5 percent for almost 31 years (DCS, 2017). Income inequality or relative poverty has remained significantly high in Sri Lanka for the past several decades despite various public policy measures taken by the government.

This compels us to investigate about what type of macroeconomic factors significantly affect income inequality in Sri Lanka. Generally, factors such as per capita GDP,

[1]Household Income & Expenditure Survey (HIES) 2016, Department of Census & Statistics (DCS), 2017, Sri Lanka

trade openness, financial deepening, average price level, government expenditure, agriculture share of GDP and the secondary school enrollment are believed to be affected personal well-being[2]. Therefore, this study is measured the effect of those variables on income inequality (which measured by Gini coefficient) to find what factors cause significant impact (positive or negative) to income inequality in the country. This enables us to bring effective policy suggestions forward. Autoregressive Distributed Lag (ARDL) method utilized for the analysis which is rarely utilized analytical method in the Sri Lankan setting. Except the methodological value, the paper discloses some of the influential factors in determining income inequality to the limited literature, which is significant.

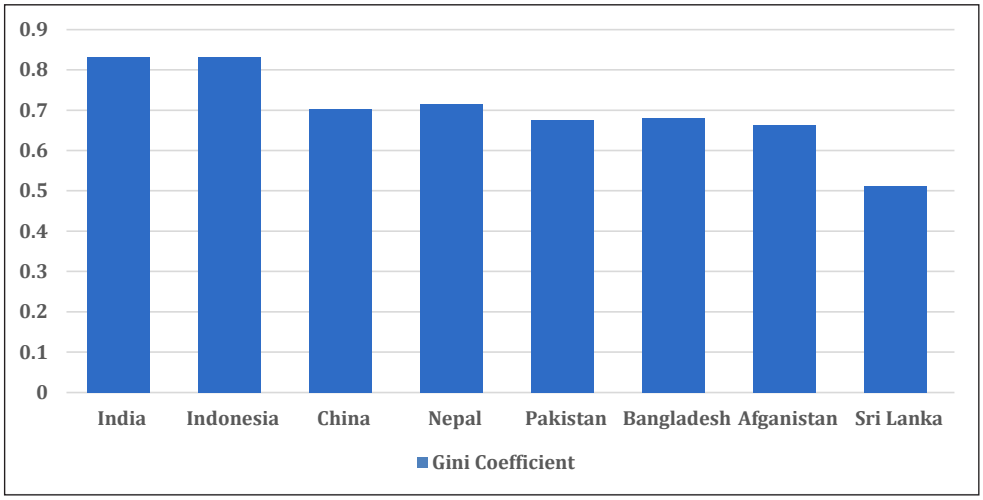

Figure 1: Gini coefficient in Sri Lanka with an international comparison, 2018/ 2020
Source: https://worldpopulationview.com/countyr-rankings/income-inequality-by-country

The rest of the paper is organized as follows. Section two discusses the relevant literature pertaining to the determinants of income inequality establishing the justification for the study. Section three explains the theoretical basis of the analytical method, variables, data, and the method of estimation. Section four devotes to presenting and discussing the results of the study, and the final section provides conclusion and discusses some policy implication.

[2] A detailed description on the choice of the variable is given in section 4 of this paper.

2. Review of literature

2.1. Theoretical background

Impact of income inequality has a long-standing history in economics, and it has continued to rise over past 35 years (Piketty, 2014; Goda, 2016).David Ricardo, Karl Marx, and John Maynard Keynes in their respective economic theories have stressed that high level of income inequality brings negative social outcomes destabilizing the economy (Atkinson, 1997; Goda, 2016). As described in respective theories, income inequality appears in two ways, namely, functional income inequality and personal income inequality. Functional income distribution distinguishes between factors of production, which measure how much of the national income goes to workers (wage share) and how much of it goes to capitalists and rentiers (profit share). In contrast, personal income distribution measures how far national income is equally distributed among individuals/ households (Bigsten, 1983 cited by Gallo, 2002). Classical economists have discussed functional income distribution, whereas neo-classical economists have mostly stressed the importance of personal income distribution (Bigsten, 1983 cited by Gallo, 2002).

Kuznets hypothesis provides an ideal theoretical basis when assessing the determinants of income inequality. The hypothesis emphasizes that inequality rises at early stage of development and then decrease when a country reached to the highest level of development. Thus, the link between inequality and economic growth takes inverted 'U' shape (Kuznets, 1955). However, Robinson (1976, cited by Barro, 1999) has stressed that when achieving economic development, labour transition takes place from the agriculture to the industry. Owing to low wages in agricultural sector, people have low GDP per capita resulting in low level of inequality, however, after moving to industry sector in urban areas their earnings get higher and so does the inequality. Barro (1999) has developed and tested a hypothesis that asserts that inequality tends to retard growth in poor countries and encourage growth in richer places.

Endogenous growth theory also discussed the link between inequality and economic growth. Under this theory, views are expressed on four main categories, namely imperfect credit market, savings rate, political economy (government redistribution policies), and socio-political unrest (Loury, 1981; Stiglitz, 1982; Atkinson, 1997; Barro, 1999). Credit market imperfection implies that when access to credit is limited, investment opportunities are grabbed only by the individuals who have assets. As a result, net profit margin will not equally distribute among individuals (Loury, 1981). Imperfect credit distribution also leads to lower investment in human capital, especially the poor is prevented investing in education due to borrowing constraints (Galor, O.,

Zeira, J., 1993). Political economy view of income inequality postulates the effect of redistributive policies (taxes and transfers) of the government. It states that heavy taxation induces income inequality, while marginal tax rate enhances economic growth (Perotti, 1993; Alesina & Rodrik, 1994). Social unrest view of inequality describes that social unrest promotes rent-seeking activities and discourages investments and thereby weaken the investments (Benhabib & Rustichini ,1996; Alesina & Perotti, 1996). However, Barro (1999) have synthesized that what matters in this context is income redistribution and political power. Thus, transfers as a means of income equalizing program promote temporary stability and stop their tendency towards rebellious behavior.

Another strand of literature has emphasized the link between savings rate and income inequality. It postulates that individuals' savings rise when their income level rises. Thus, inequality will rise and so does the investments. However, the redistribution of income from the rich to the poor will lower the national savings (Barro, 1999).

2.2. Empirical evidence

Empirical studies on income inequality have mostly focused on two issues, namely, the growth effect of income inequality and factors that are responsible for income inequality. A wide array of studies is available on the relationship between income inequality and economic growth (Barro, 2000; Forbes, 2000; Azzoni, 2001; Bandelj & Mahutga, 2010). These studies have emphasized that income inequality tends to hinder economic growth in developing countries, but there are no such effects in rich countries. Endowment inequality, one of the reasons for income inequality has a harmful growth effect. Several studies have found that inequality in land ownership is negatively affect economic growth (Alesina & Rodrik, 1994; Persson & Tabellini, 1994; Alesina & Perotti, 1996).

Studies on the determinants of income inequality have, however, focused on several dimensions, namely, microeconomic factors, macroeconomic factors, and structural factors. Okatch et al. (2013) analyzed country specific microeconomic factors of income inequality in Botswana. He has emphasized that secondary school education, training, value added tax, number of children of a household, and number of working adults in the household contribute significantly to income inequality in Botswana. Primary education, age, and owning between 1 and 10 head of livestock tend to equalize income inequality. A study with reference to Pakistan has revealed that land ownership, education, and location of household are highly significant determinants of income inequality in Pakistan (Naschold, 2009). Similar conclusions have also been drawn previously by various other studies as well (Adams and Alderman, 1992; Adams,

1994; Mengesha, 2019). All these studies are based on decomposition method, namely, decomposition by income source (Fei et al., 1978; Shorrocks, 1982; Fields, 1988) and decomposition by population sub-groups of Blinder (1973) and Oaxaca (1973). Based on these studies, factors such as education, land ownership, age, gender, members of the household, location of residence, livestock ownership, non-farm activities, urbanization, and level of government activities can be identified as micro determinants of income inequality.

With reference to macroeconomic determinants of income inequality, a recent study in OECD countries has found that increase in income inequality is determined by financial development, deepening of labour flexibility, and weakening of trade unions (Tridico, 2017). A study with reference to India and Pakistan has revealed that per capita GDP, government consumption expenditure, fertility rate, value addition by agricultural sector, per capita arable land, urban population, and globalization tend to determine income inequality (Munir and Sultan, 2017). They have emphasized that special attention must be given to reducing high fertility rate, especially in the lower class of the society, to reduce income inequality. In addition, Feenberg and Poterba (1993) have found that tax incentive and wage differentials have determined income inequality in USA. Mocan (1999) argued that structural unemployment is a highly influential determinant of income inequality and inflation has also had a progressive impact on income inequality. Odedokun and Round (2004), focusing on African countries, have investigated on the relationship between growth and inequality as well as determinants of income inequality. They have found that the share of labor force in agricultural sector, regional factors, level of economic development, size of government budget as well as land and human resource endowments are main determinants of income inequality in those countries. They have also found that the relationship between income inequality and growth is negative in African countries.

Studies related to Sri Lanka on this regard are relatively limited. Deshappriya (2017) has investigated the impact of macroeconomic factors on income inequality, distribution, and economic growth across 33 Asian countries including Sri Lanka found evidence that support the Kuznets hypothesis. His study also found that official development assistance (ODA), education, and labor force participation tend to reduce income inequality while higher inflation, political risk, terms of trade, and unemployment increase inequality in Asian countries. Karunaratna (2000) has shown that age difference of income receivers is a significant factor that determines income inequality in Sri Lanka. The study found that, in terms of Theil L index, age differences contributed much to the total income inequality in the urban sector. Another micro level analysis by Perera et al. (2014) with reference to Sri Lanka emphasized that trade liberalization tends to lower both the level of overall income inequality, and income inequality among different households.

Arun et al. (2013), addresses the question of how greater equality by gender and race/ ethnicity in the distribution of earnings would affect earnings inequality in Sri Lanka. The findings revealed that men had average high earnings having a discriminatory impact against women earners. On the other hand, Gunatilake et al. (2006) examined whether structural change leads to changes in income distribution in Sri Lanka. Structural changes in education, industry and infrastructural access following trade liberalization in 1977 affected more on income distribution. However, the study asserted that the middle class appeared to have received more benefits of provision of education and infrastructure access than that of the poor.

Even though, these studies with reference to Sri Lanka have made a significant contribution to understanding causes of income inequality in different perspectives, a lack of a comprehensive methodology in those analysis is a limitation. This paper contributes to the literature by using a comprehensive analytical framework that can measure both short-term and long-term effects of country-specific macroeconomic variables on income inequality in the Sri Lankan context. The objective of this paper is therefore, to examine the short run and long run determinants of income inequality of Sri Lanka, using data obtained from the secondary sources.

3. Model and data

The study used a quantitative approach to achieve the desired objectives. The analytical procedure started with a diagnostic analysis of the stationarity of variables of the model using Augmented Dickey-Fuller (ADF) test, followed by the estimation of the Auto Regressive Distributed Lag model, which is the focal estimation of the paper. The analysis then extends to test the Error Correction Model (ECM) to observe short term dynamics.

ARDL based co-integration tests have widely been used for analyzing the long-run relationship between macroeconomic variables that face common problem of stationary. Residual based tests (see Angle and Granger, 1987; Shin, 1994), Variable Addition Approach (see Park, 1992), Stochastic Common Trend Approach (see Stock & Watson ,1993), and a System-based Ranking regressions Framework (see Johanson, 1991) are the most popular analytical methods that have previously been employed. However, a common problem associated with these tests is that these tests can only be used when the underline economic variables in the model is either stationary at their levels -I(0) or they are integrated of order one -I(1) which requires pretesting of variables. However, the Auto Regressive Distributed Lag (ARDL) approach proposed by Pesaran & Shin (1999) has been designed to overcome these issues. The ARDL is a better approach because it can be used irrespective of whether a series is I(0) or I(1), and an Unrestricted Error Correction Model can be derived from ARDL bound testing through a simple linear transformation of the model which contains both short-run and long-run dynamics.

The model can be described as follows:

$$Y_t = a_0 + a_1 t + \sum_{i=1}^{p} \phi Y_{t-i} + \beta' X_t + \sum_{i=0}^{q} \beta_1 * \Delta X_{t-i} + u_t \quad \ldots\ldots(1)$$

$$\Delta X_t = P_1 \Delta X_{t-1} + p_2 \Delta X_{t-2} + \ldots + P_s \Delta X_{t-s} + \varepsilon_t \quad \ldots\ldots(2)$$

where, Y is the dependent variable and X_t is the k dimensional I(1) variables which are not co-integrated among themselves. u and ε are serially uncorrelated disturbances. Letters p and q represents the lag length of dependent variable and explanatory variables respectively. The above model short run dynamics are represented by differenced lag of explanatory variables and the variables without the differenced represent long run dynamics. Lag length of variables are different from one another since the ARDL method allows to use variables different lag lengths.

The above equations are tested for Sri Lanka using eight variables. Since, the Gini coefficient (GINI) is the long-standing measure of income inequality worldwide, the GINI is used as a proxy for income inequality in Sri Lanka and it is the dependent variable of the model. Seven explanatory variables are included in the model following both theoretical and empirical literature. In this respect, GDP per capita (PGDP) is chosen as it is commonly used as a broad measure of average living standard or economic wellbeing of individuals in the society. Theoretically, it is said that trade openness (TO), which measures the actual size of the registered imports and exports of the country help reducing inequality, however empirical studies have found mixed results (Perera et al., 2004; Hamori & Yohihiro, 2012). Therefore TO is also utilized to check its impact on inequality in the Sri Lankan context. Many argued that financial deepening (FD) with a well-developed financial sector provides affordable financial services to people which enhance the real income of the poor and there in reduce inequality (Hamori & Yohihiro, 2012). The choice of average price level (P) as a variable based on its direct impact on consumption. Some studies have argued that price hike directly reduces disposable income of the people disregarding their income status, therefore, inequality reduces (Bulier, 1998) while some other have explained that inflation forced to reduce working hours and hence reduce income (Fischer, 1993; King & Wolman, 1996). government expenditure (GE), on the other hand is an important factor for inequality. Transfers in GE help enhancing the living status of the poor (Barro, 1999). The choice of the agricultural sector share in the GDP (AGRI) is because poverty is disproportionately concentrated in rural area in Sri Lanka (shown in Table 1) and agriculture is the main occupation is most of the households in rural areas. Their income regularly changes with the volatility in agricultural production and prices. Therefore, including that variable into the model help identifying its impact on inequality as well. Secondary School Enrollment Ratio (SER) is also important as it is said that educational attainments help reducing income inequality among households in some parts in Sri Lanka (Deshapriya, 2017; Gunatilake et al., 2006), therefore it included in the model to recheck the validity of previous findings.

Annual data from 1978 to 2019 is used that are collected from the secondary sources are used for the analysis. The time frame is decided because the study used the trade openness (TO) as an explanatory variable. Sri Lanka removed barriers to free and fair international trade in 1977.

As described above, the ARDL approach used to examine the macroeconomic determinants of income inequality in Sri Lanka. Thus, in line with the equation 1 and 2 above, the following model is specified by fitting the selected variables:

$$\Delta GINI_t = \alpha_{10}+\alpha_{11}GINI_{t-1}+\alpha_{12}PGDP_{t-1}+\alpha_{13}TO_{t-1}+\alpha_{14}FD_{t-1}+\alpha_{15}P_{t-1}+\alpha_{16}GCE_{t-1}+\alpha_{17}AGRI_{t-1}$$
$$+\alpha_{18}SER_{t-1}+\beta_{11}\sum_{i=1}^{p}\Delta GINI_{t-i}+\beta_{12}\sum_{i=0}^{q}\Delta PGDP_{t-i}+\beta_{13}\sum_{i=0}^{q}\Delta TO_{t-i}+\beta_{14}\sum_{i=0}^{q}\Delta FD_{t-i}+\beta_{15}\sum_{i=0}^{q}\Delta P_{t-i}$$
$$+\beta_{16}\sum_{i=0}^{q}\Delta GCE_{t-i}+\beta_{17}\sum_{i=0}^{q}\Delta AGRI_{t-i}+\beta_{18}\sum_{i=0}^{q}\Delta SER_{t-i}+\varepsilon_1 \quad (3)$$

Where, the long run effects inferred by the coefficients represented by the term α placed near the variables which are assumed to be the determinants of income inequality in Sri Lanka. The null hypotheses of (H_0: $\alpha_1=\alpha_2=\alpha_3=\alpha_4=\alpha_5=\alpha_6=\alpha_7=\alpha_8=0$), which states that co-integration doesn't exists among the variables tested against the alternative hypotheses of (H_1: $\alpha_1\neq\alpha_2\neq\alpha_3\neq\alpha_4\neq\alpha_5\neq\alpha_6\neq\alpha_7\neq\alpha_8\neq0$), that indicate the presence of co-integration between the utilized variables.

To measure the speed of adjustments with short run dynamics in the above equation can be explained by the following specification:

$$\Delta GINI_t = \beta_{10}+\beta_{11}\sum_{i=1}^{p}\Delta GINI_{t-i}+\beta_{12}\sum_{i=0}^{q}\Delta PGDP_{t-i}+\beta_{13}\sum_{i=0}^{q}\Delta TO_{t-i}+\beta_{14}\sum_{i=0}^{q}\Delta FD_{t-i}+\beta_{15}\sum_{i=0}^{q}\Delta P_{t-1}$$
$$+\beta_{16}\sum_{i=0}^{q}\Delta GCE_{t-i}+\beta_{17}\sum_{i=0}^{q}\Delta AGRI_{t-i}+\beta_{18}\sum_{i=0}^{q}\Delta SER_{t-i}+\mu_{11}ECM_{t-1}+\eta_1 \quad (4)$$

The results of the test are explained in the subsequent sections of the paper.

4. Results and discussion

As described the preceding section, presence of unit root of variables utilized for the model gives spurious results. Besides, unit root test is important here to identify the level of stationarity as the proposed ARDL method cannot be utilized if any variable became stationarity at their second differenced -I(2). Therefore, unit root test is carried out to check the level of stationarity of variables as the first step of the analysis. The results are shown in Table 2.

Table 2: Results of the unit root test

Variable	ADF test (Level)	ADF test (1st Diff.)	Variable	ADF test (Level)	ADF test (1st Diff.)
GINI	-3.956511	-3.485163	TO	-1.638645	-4.861962
	(0.0185)**	(0.0547)**		(0.7594)	(0.0018)***
PGDP	0.592673	-4.643776	FD	-2.625340	-4.456314
	(0.9992)	(0.0032)***		(0.2718)	(0.0053)***
GE	-2.075246	-4.493877	AGRI	-2.467613	-5.045410
	(0.5433)	(0.0048)***		(0.3415)	(0.0011)***
P	-1.036662	-3.865059	SER	-1.800432	-4.206068
	(0.9270)	(0.0233)**		(0.6853)	(0.0103)**

, **, * represent the level of significant at 10%, 5% and 1% respectively. (P value is in parenthesis) level of significance is based on Akaike Information Criteria (AIC).*
Source: Author's own estimations

The results of the Augmented Dickey-Fuller (ADF) test revealed that all variables become stationary at their first difference, except GINI which is stationary at its level. None of them shows second order stationarity I(2), therefore, utilization of ARDL method is possible.

ARDL test results

Results of the ARDL test (shown in Table 3) indicated several relationships. First, per capita GDP (PGDP), which represents economic growth, indicates a positive relationship with income inequality showing that enhancing economic growth leads to widen the inequality. This finding is in consistent with many existing studies which have emphasized that economic growth induces income inequality (Nielsen & Alderson ,1995; De Gregorio & Lee, 2002). The result also confirms the Barro's hypothesis which states that economic growth increases income inequality in poor countries than it does in the rich nations (Barro, 1999). However, since the magnitude of the coefficient is smaller, it can be stated that the effect of economic growth to income inequality is not severe compared to the effects of other variables on inequality.

Second, government expenditure (GE) did not show any significance, however its lagged value was significant at 5 percent level, indicating a positive sign, which emphasizes that increase in government expenditure increases income inequality in the Sri Lankan setting. This finding is in line with the findings of Dong-Hyuk and Samarasekara (2022). The fact that government consumption positively affect income

inequality indicates that underlying arguments of provisions of government facilities for the community may not equally benefit the entire population (Milanovic, 1994). Some segments of population are benefited less while some enjoys a bigger share due to political reasons (Rhee et al., 2014).

Third, trade openness (TO) has shown a positive and significant, emphasizing openness induces income inequality, which is contrast to the findings of Perera et al. (2014) and Hamori and Yohihiro (2012). However, Perera et al. (2014) conducted a micro level study using households and therefore, results of that study cannot be generalized to the entire country. Sri Lanka is still an upper middle-income country, where around 70 percent of population is still living in rural areas. Most industries are still urban centered and so does the trade and investment opportunities. Therefore, most of the rural population does not have equal opportunities to engage in trade and investments. Thus, they cannot reap the opportunities generated by trade openness, like urban counterparts, which results in greater inequality.

Table 3: Results of the ARDL estimation

Variable	Coefficient	Prob.*
GINI (-1)	0.945291	0.000***
PGDP	0.003534	0.0251**
GCE	-0.019600	0.8843
GCE(-1)	0.219498	0.0583**
P	-0.13758	0.0128**
TO	0.09712	0.0201*
FD	0.022096	0.5174
AGRI	-0.321092	0.0882**
AGRI(-1)	0.244448	0.2960
SER	0.085948	0.1129
C	-6.828953	0.4863
Adjusted R^2	66.45	
DW statistics	2.0776	

,,***, indicates the level of significance at 10%, 5% and 1% respectively*
Source: Author's own estimation

Fourth, results indicate that average prices (P) tend to reduce income inequality. However, there is no concrete theoretical basis for the relationship between inflation and inequality. Empirical literature on this regard is also providing mix results though some studies have stated that inflation reduces income inequality (Bulier, 1998;

Maestri & Roventini 2012; Monnin, 2014) because inflation reduces average wealth of the population, and it can have some implication on income inequality. Galli and Vander Hoeven (2001) also revealed that rising inflation is associated with a decrease in inequality for low initial inflation rates and with an increase for high initial inflation rates. This may be the case in Sri Lanka at present[3] .

Fifth, the results of the proxy for agricultural development also significant with negative sign implying that agricultural development reduces income inequality. This finding supports long-standing argument that agricultural development helps people to strengthen their livelihoods and stabilize their income {Lee et al., 2013). This is also consistent with the results of some studies of the economies that have similar characteristics to the economy of Sri Lanka. In a study in Vietnam, Cuong (2010) stressed that agricultural production reduces rural income and expenditure inequality. Even though industry and services sector occupy the biggest share of GDP, the agricultural sector remains the mainstay for most of the population and continues to be an important source of income (Ravallion & Chen, 1997) which is a condition that is valid to Sri Lanka as well. Most of the rural population is stills engaged in agriculture and the country's main exports consist of agricultural products[4].

Sixth, results of financial deepening didn't show any significance. This may be due the fact that stage of financial development in Sri Lanka is still low where some segments of the population do not even have a formal bank account or access to formal credit in both rural and urban low-income families. Even though Central Bank of Sri Lanka asserts that there are 89 percent account holders in Sri Lanka, most of the accounts are not regularly active (CBSL, 2019).

Finally, secondary school enrollment (SER) in Sri Lanka tends to have a positive effect on income inequality but the coefficient is not statistically significant. However, the finding contradicts most of the existing literature which emphasized that higher secondary school enrollment ratio reduces income inequality in many countries (Bourguignon & Morrisson, 1990; Nielsen & Alderson, 1995; Barro, 2000). In contrast, the result of the present analysis supports some of the findings that claim

[3] This study utilized data up to 2019. After 2019 and till this moment, Sri Lanka is experiencing a quite high inflation rate which has started with Covid-19 pandemic led supply shortage. Thereafter global energy price hike and severe foreign currency shortage in the country made another supply shortage of food and fuel which led significant price hike in food and fuel. Therefore, the comment on single digit inflation cannot be applied to present Sri Lankan scenario.

[4]Agricultural statistics have shown that sectoral contribution of agriculture to the GDP is gradually declining in Sri Lanka, however it is still the main income generating activity in majority of rural population. Thus, development occur in the agricultural sector benefit rural poor .

that secondary school enrollment induces income inequality (De Gregorio & Lee, 2002; Milanovic & Square, 2005). Barro (1999) has found that link between primary education and income inequality is negative, though it is positive for higher education attainment. When population has a higher average number of years of primary education per person (aged 15 and over), inequality is lower. However, when populations tend to have a higher average number of years of higher education per person, inequality becomes higher. Number of years of secondary schooling in Sri Lanka is 8 years and the age limit for secondary education is decided by the government. Even though there is a public funded education system in Sri Lanka, uneven distribution of educational facilities and poverty related social issues appear to prevent young generation from attending schools. A survey reveals that 23.8 percent of poor children in 15-16 year age group and 64.7 percent of poor children in 17-18 year age group are not attending schools due to economic difficulties (Nanayakkara, 2017). In addition, the share of skilled labor in the labor force, and the share of female labor in the total labor force may also explain this situation.

At the final stage of the analysis, ECM test was conducted to test the influence of deviation of variables from the long run equilibrium on its short run dynamics, and results are shown in Table 4.

Table 4: Error correction results

Variable	Coefficient	Prob.
C	-6.828953	0.0000***
D(GCE)	-0.019600	0.8309
D(TO)	0.097102	0.0057**
D(AGRI)	-0.321092	0.0040***
CointEq(-1)*	-0.054709	0.0000***

Source: Author's own estimation

As indicated by the results, the existence of one co-integration link between variables except secondary enrolment ratio and financial deepening (Table 4). Short run dynamics of trade openness indicates 9.7% of slow adjustment towards the equilibrium, while agricultural share indicates 32% of speed of adjustment towards the equilibrium.

The adjusted R^2 was 0.66, indicating that 66 percent of the variation of the response variable explained in the model, which is a good sign that indicates the model is good fit, while the residual autocorrelation test indicates the absence of serial correlations among residuals. In addition, CUSUM and CUSUM of Square test indicated that the model is stable at 5 percent significant level.

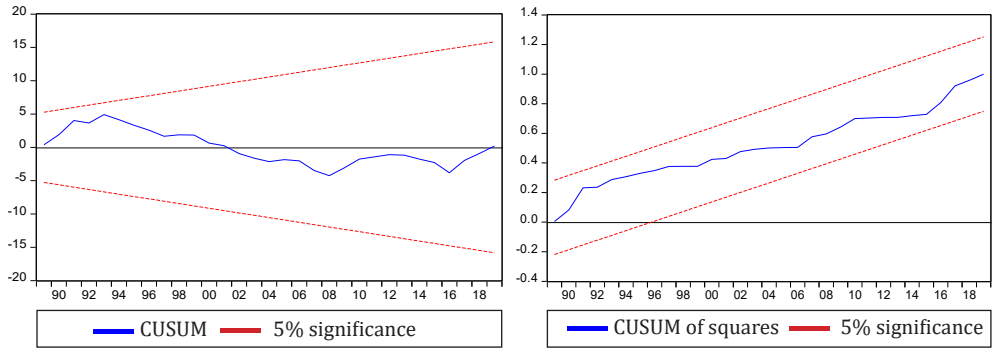

Figure 2: Results of CUSUM and CUSUM of squired test
Source: Author's own estimation.

For the confirmation of results, the study ran a residual diagnostic test, in which it indicated that residuals are normally distributed.

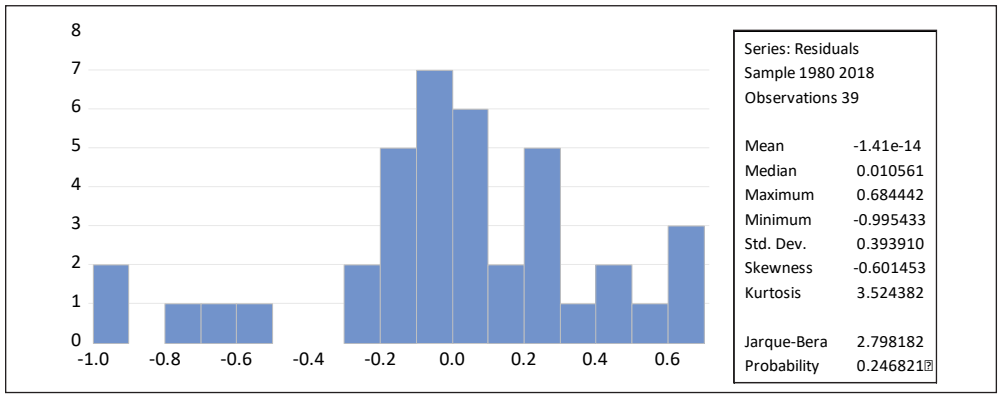

Figure 3: Results of residual diagnosis test
Source: Author's own estimation.

Based on the test results, the study has drawn some conclusions which present in the following section.

5. Conclusion

Income inequality has been significantly high in Sri Lanka in recent times despite the existence of well-established social security network within the country. In this backdrop, the focus of this paper was to identify the macroeconomic determinants of income inequality in Sri Lanka. Results of the analysis have revealed that government final consumption expenditure and trade openness seemingly induce income inequality, while average price level and the share of agriculture to the GDP have contributed to reducing income inequality of the country. Per capita GDP also shows a significant and smaller positive effect on income inequality showing that increase in country's per capita GDP increase income inequality. However, financial deepening and school

enrollment ratio do not have significant impact on income inequality in the country. Thus, the paper concludes that government consumption, trade openness, average prices, agricultural development, and per capita GDP are the main macroeconomic determinants of income inequality in Sri Lanka among the chosen variables. Results support Barro's view of income inequality with reference to trade openness in which he stressed that trade openness induces inequality in poor countries.

Policy implications that can be drawn from the study includes government should provide incentives for agricultural sector introducing modern farming methods and high yielding variety of crops to earn more income from agricultural activities as the results have shown that agricultural development reduces income inequality. This would be more beneficial to rural sector in enhancing income of the rural population and it will help reducing the rural poverty as most of the population in rural sector engage in agriculture related employments. On the other hand, encouraging youth to engage in agricultural sector work like agribusiness and strengthening agricultural supply chain will also be benefited in this regard. In addition, provide trade facilitation through infrastructure development, reduction in transaction cost, and providing incentives to encourage e-business and other measures should be taken to capture the positive spillover effects of international which benefits economic growth as well as the rural poor. That would ultimately lead to reduce trade induce inequality in the open economic environment. Further, maintaining a stable general price level also important policy option to reduce the cost of living of the poor. To the end, government transfer programs should especially target the poor and proper monitoring mechanism should be maintained to capture the outcome of those transfers. Currently, such follow up system is not in place therefore, the government's targets of reducing inequality to the fullest.

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