Macroeconomic Determinants of Income Inequality in Sri Lanka

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Abstract

Even though several different income redistribution plans have been put in place by succeeding governments, income disparity has persisted in Sri Lanka over the past 50 years. Using secondary data from 1978 to 2021, this study aims to pinpoint the macroeconomic factors that contribute to income inequality in Sri Lanka. The basic estimating method is the autoregressive distributed lag model (ARDL), a rarely used analytical tool in Sri Lanka. The results show that the primary macroeconomic predictors of income inequality in Sri Lanka among the selected variables are government spending, trade openness, average prices, the share of agriculture in the GDP, and per capita GDP. Additionally, the findings demonstrate that trade openness and government spending cause income inequality, supporting Barro's theory. Additionally, the average price level and the percentage of agriculture in the GDP have helped to lessen income disparity in the nation. Per capita GDP also shows a marginal significance, supporting Kuznets' view, which stresses that increasing a country's GDP increases inequality. However, financial deepening and secondary school enrolment ratios do not show significant impacts emphasizing that financial and education factors do not contribute to inequality in the Sri Lankan setting. The study suggested that policy priority should be given to developing the agricultural sector and catching the spillover effect of international trade to reduce income inequality. That would ultimately lead to lowering trade-induced inequality. Furthermore, a crucial policy choice to lower the expense of daily life for the poor is to maintain a constant overall price level. Government transfer programs should primarily target the poor and maintain a proper monitoring mechanism to capture the outcome of those transfers also important. Currently, such a follow-up system is not in place; therefore, the government's targets of reducing inequality couldn't be realized to the fullest.

Keywords: ARDL model, income inequality, openness, trade spillover JEL Code: C32, D63, E60

INTRODUCTION

Even though successive administrations have implemented various income redistribution schemes intended to reduce income inequality, economic inequality has persisted in Sri Lanka for the past 50 years. The Gini coefficient, which measures income inequality, was 0.51 in 2018, indicating a high level of income disparity in Sri Lanka.). As shown in HIES-2016 report, though the poverty headcount index has declined from 6.7 percent in 2012 to 4.1 percent in 2016, inequality remains relatively high (the Gini coefficient was 0.48 in 2012 and 0.45 in 2016)[1]. This indicates sectoral variances in income inequality across the country. In Sri Lanka's cities, and particularly in the Colombo district, the level of income disparity is five times more than in other districts. Recent polls reveal that the Colombo district's 'richest group' takes home 72.9 percent of the area's total household income. More than 41% of the households in this district are categorised as being part of "the most affluent group" because they make an average monthly

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

income of at least Rs. 81,372 (Nanayakkara, 2018). Internal migration and skill mismatch have been recognized as reasons for this situation. As stressed by this research, income inequality in rural areas is also relatively high. It is attributed to inadequate job opportunities, insufficient attention to the agricultural sector, lack of infrastructure facilities to connect with urban industrial centers, and low female labor force participation (only 36 percent of females in the rural sector).

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. Large income inequality tends to impede the development of material as well as human capital, according to IADB and Gallo (2002). The first to propose a connection between income inequality and economic growth was Kuznets (1955), who emphasised that when a country's per capita income increases, inequality initially worsens before progressively improving. His thesis made clear that when a country is in the preindustrial stage initially, everybody is equally poor with low income. However, when the country experiences industrialization, people with potential earn more, creating an income gap in society.

This has become a common phenomenon in many countries regardless of the level of development at present. According to Allison et al.'s (2014) study, the rise in income disparity between developed and developing nations over the past three decades has shown that the richest 10% of OECD citizens have incomes that are ten times higher than those of the poorest 10% in developing nations. The wealthiest 10 percent earned seven times higher than the poorest 10 percent. Based on these scenarios, Piketty (2014) has challenged the famous Kuznets curve emphasizing that countries tend to experience income inequality even after they have reached the advanced stage of development. He further stressed that the inverted 'U' shape curve no longer exists; instead, an 'S' curve can be observed.

As previously discussed, sectorial income inequality is high in Sri Lanka (Table 1). As shown in HIES-2016 report, though the poverty headcount index has declined from 6.7 percent in 2012 to 4.1 percent in 2016, inequality remains relatively high (the Gini coefficient was 0.48 in 2012 and 0.45 in 2016). Over the years, a difference in the Gini coefficient cannot be observed in all three sectors in Sri Lanka. The estate sector maintains low-income inequality as almost all in the estate sector shares equal earnings and other related assets. However, there are large income gaps between the urban and rural sectors, where formal sector employees earn significantly more than informal sector workers. The consumption of goods and services differs between the official and informal sectors and between urban and rural households according to their job status. It is clear that there are more income disparities between the rural and urban sectors than there are in the real 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). In comparison to other Asian nations, income inequality has been notably high in Indonesia (0.83 and India (0.83). Nepal and Bangladesh have the highest levels of economic disparity among the nations of South Asia. Sri Lanka has the lowest level of income disparity in the entire South Asian region.
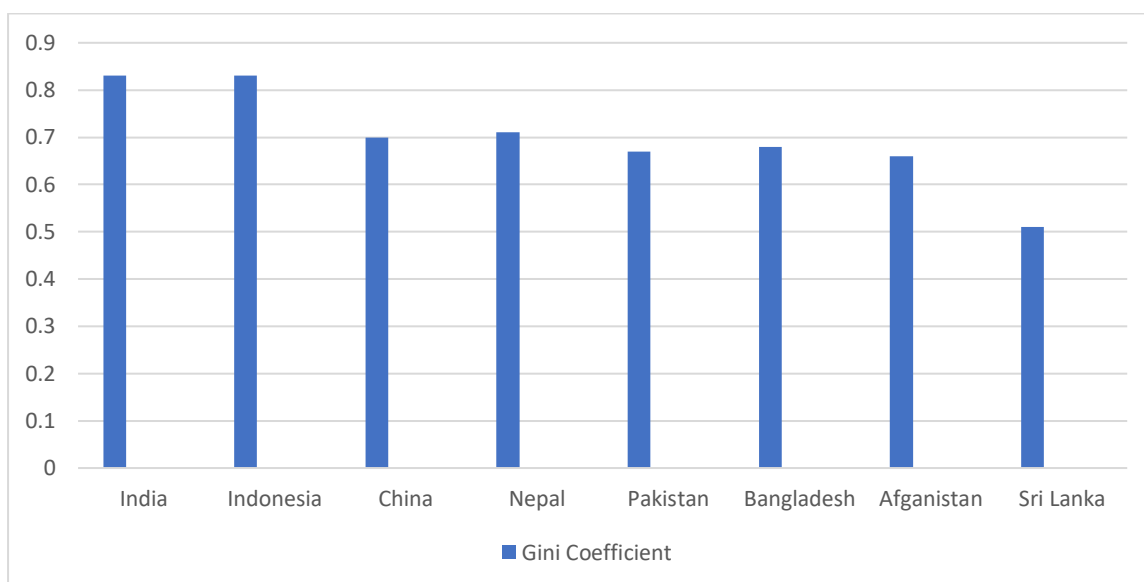
Figure 1 - Gini coefficient in Sri Lanka with an international comparison- 2018/2020

Source: Worldpopulationview.com

To comprehend the income disparity in Sri Lanka, one can also use the quintile income distribution. In 2016, the top 10 percent of the overall population received 32,9 percent of the total income, while the bottom 10 percent received 2.9 percent. The top 20% of the population also received 47.6% of the overall revenue in 2016, compared to a minimum of 41% in 1985. In 2016, only 7% of income went to the bottom 20% of the population, a percentage that has mostly remained constant throughout time and has been below 5% for nearly 31 years. (DCS, 2017). As indicated in Table 1, income inequality or relative poverty has remained significantly high in Sri Lanka for the past four decades despite various public policy measures taken by the government.

This compels us to investigate what macroeconomic factors significantly affect income inequality in Sri Lanka. Generally, factors such as per capita GDP, trade openness, financial deepening, average price level, government expenditure, agriculture share of GDP, and secondary school

enrollment are believed to be affected by personal well-being[2]. This study analysed the influence of such factors on income inequality (which is measured by the Gini coefficient) in order to ascertain if they have significant effects (positive or negative) on economic inequalities in the country. This makes it possible for us to provide useful policy ideas. The research was conducted using the rarely applied analytical technique called the autoregressive distributed lag (ARDL) approach in Sri Lanka. Except for the methodological value, the paper discloses some influential factors in determining income inequality to the limited literature, which is significant.

The essay is organised with the following structure for the remaining portions. The consideration of relevant research on the causes of income disparity in Section 2 establishes the justification for the investigation. The theoretical underpinnings of the analytical approach, variables, data, and estimating method are explained in section three. Part four of the study presents and discusses the findings, and part five of the study concludes with some possible policy implications.

LITERATURE REVIEW

Theoretical background

The impact of income inequality has a long-standing history in economics, and it has continued to rise over the past 35 years (Piketty 2014, Goda 2016). David Ricardo, Karl Marx, and Keynes, in their respective economic theories, have stressed that a high level of income inequality brings adverse social outcomes destabilizing the economy (Atkinson 1997, Goda 2017). Income inequality manifests in two forms, namely, functional income inequality and personal income inequality, as outlined in the relevant theories. Functional income distribution makes a distinction between the factors of production, which calculate the wage part of the national income and the profit portion of capitalists and rentiers. Personal income distribution, in contrast, gauges how evenly households and individuals are spread across the nation's income (Bigsten 1983; referenced in 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 in Gallo 2002).

The Kuznets hypothesis offers the best theoretical foundation for analysing the factors that contribute to income disparity. The idea contends that inequality rises in underdeveloped countries and falls after they reach their highest level of development. The correlation between inequality and economic development is thus shaped like an inverted 'U' (Kuznets, 1955). Robinson (1976, cited in Barro 1999) has, however, emphasised that shifting man-power from agricultural to industry is necessary for economic progress. People have low GDP per capita because of the low wages in the agricultural sector; but, as they move into the industrial sector in urban areas, their earnings increase

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

and the disparity does as well. A theory put forth and proven by Barro (1999) contends that inequality tends to promote growth in more developed countries while slowing it in less developed ones.

The relationship between inequality and economic growth is a topic covered by endogenous growth theory. Under this theory, views are expressed on four primary categories, namely imperfect credit market, savings rate, political economy (government redistribution policies), and socio-political unrest (Atkinson 1997, Stiglitz 1982, Loury 1981, Barro 1999). Credit market imperfection implies that when access to credit is limited, investment opportunities are grabbed only by individuals with assets. As a result, the 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 are prevented from investing in education due to borrowing constraints (Galor & Zeira 1993, Piketty 1996). The political economy view of income inequality postulates the effect of redistributive policies (taxes and transfers) on the government. It states that heavy taxation induces income inequality, while marginal tax rate enhances economic growth (Perotti 1996, Easterly & Rebelo 1993, Alesina & Rodrik 1994). The social unrest view of inequality describes that social unrest promotes rent-seeking activities and discourages investments and thereby weakening the investments (Benhabib & Rustichini 1996, Alesina & Perotti 1996). However, Barro (1999) has synthesized that what matters in this context is income redistribution and political power. Thus, transfers as an 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, when inequality increases, so do investments. But transferring wealth from the wealthy to the poor will reduce national savings (Barro 1999).

Empirical Evidence

The growth impact of income disparity and the causes of income inequality have been the two main topics of empirical studies on income inequality. Numerous studies have examined the link between wealth inequality and economic growth (Barro 2000, Forbes 2000, Azzoni 2001, Beckfield 2009, Bandelj and Mahutga, 2010). This research has stressed that while income disparity has no negative effects in prosperous countries, it has a detrimental effect on the growth of the economy in less developed countries. Endowment inequality is a factor in income inequality and has a detrimental impact on growth. Uneven land ownership has a negative effect on economic growth, according to various studies (Alesina and Rodrik 1994, Persson and Tabellini 1994, Alesina and Perotti 1996).

However, studies on the causes of income disparity have mostly concentrated on three aspects: microeconomic, macroeconomic, and structural issues. Okatch (2013) investigated the microeconomic elements that contribute to income disparity in Bostwana. He has stressed that a number of factors,

including the value-added tax, secondary schooling, training, the number of children residing in a household, and some working adults, are significant contributors to the economic inequality in Botswana. Age, having a primary education, and possessing 1 to 10 cattle head tend to balance out income differences. A study concerning Pakistan has revealed that land ownership, education, and household location are highly significant determinants of income inequality in Pakistan (Naschold 2017). Similar conclusions have also been drawn previously by various other studies (Adams and Alderman 1992, Adams 1994, Mengesha 2019). The basis for all of these analyses is the decomposition approach, 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). According to this research, the micro determinants of income disparity include things like education, land ownership, age, gender, household members, place of residence, livestock ownership, non-farm activities, urbanisation, and the extent of government involvement.

An increase in income inequality is caused by financial development, greater worker flexibility, and weaker trade unions, according to a recent OECD study on the macroeconomic causes of income disparity (Tridico 2017). According to studies on India and Pakistan, elements that affect income disparity frequently include characteristics like per capita GDP, government spending on consumption, birth rates, the value generated by the agricultural sector, per capita arable land, urban population, and globalisation. They have stressed that a specific effort must be devoted to reducing high fertility rates, particularly among the poorer strata of society, in order to minimise income imbalance. Additionally, tax incentives and salary disparities have been proven to influence income inequality in the USA, according to Feenberg and Poterba (1993). According to Mocan (1999), structural unemployment is a significant factor in determining income disparity, and hyperinflation has also had a progressive effect on it. Odedokun and Round's (2004) study of the determinants of income inequality and the relationship between inequality and economic growth focused on African showsries. They found that the percentage of the labour force employed in the agricultural industry, regional features, the rate of economic growth, the quantity of the government allocated funds, and endowments in terms of both land and people resources were the main causes of income differences in those countries. They also found a poor association in African countries between growth and wealth disparity.

There haven't been many studies on Sri Lanka in this area. In 33 Asian nations, including Sri Lanka, Deshappriya (2017) examined the effects of macroeconomic factors on income inequality, distribution, and economic growth and discovered evidence in favour of the Kuznets hypothesis. Additionally, his study has demonstrated that while factors such as rising prices, political risk, poorer trade conditions, and joblessness tend to make the inequality in Asian countries worse, factors like official development aid (ODA), education, and participation in the labour force tend to make it worse. Age disparities between income receivers have a substantial impact on Sri Lanka's economic inequality, according to a study done by Karunaratna in 2000. The study found that, in terms of the Theil L index,

age differences contributed much to the total income inequality in the urban sector. Perera et al. (2014) highlighted that trade liberalisation tends to lessen both the overall income disparity and the income inequality across various families in their micro-level analysis of Sri Lanka. How greater gender and racial/ethnic equality in the distribution of incomes would affect earnings inequality in Sri Lanka is an issue that is addressed by Arun et al. in 2003. The findings revealed that men had high average 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. The study claimed that the middle class, as opposed to the destitute, appeared to have benefited more from the availability of education and infrastructure access.

Despite the fact that this research on Sri Lanka has made a substantial contribution to our understanding of the reasons for income disparity from various angles, one drawback of these analyses is the lack of a thorough methodology. By enabling the quantification of the immediate and long-term effects of macroeconomic variables specific to Sri Lanka on income inequality, the application of a detailed analytical technique in this research contributes to the existing pool of knowledge. The goal of this study is to ascertain the immediate and lasting effects of income disparity in Sri Lanka using data from secondary sources.

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 autoregressive distributed lag model, which is the focal estimation of the paper. The analysis then extends to test the 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 a 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 and Watson 1988), 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 are either stationary at their levels -I(0) or they are integrated of order one -I(1), which requires pretesting of variables. However, Pesaran et al. (2001)'s autoregressive distributed lag (ARDL) approach has been developed to address these problems. The ARDL is a superior method because it can be applied regardless of whether a series is I(0) or I(1), and because it can be used to generate an unrestricted error correction model from ARDL bound testing and encompasses both short-run and long-run dynamics.. The model can be described as follows:

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

$$\Delta X_t = P_1 \Delta X_{t-1} + P_2 \Delta X_{t-2} + \ldots + P_s \Delta X_{t-s} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where Xt is the set of k dimensional I(1) variables that are not co-integrated with each other and Y is the dependent variable. Serially uncorrelated disturbances u and e exist. The dependent variable's and explanatory variables' respective lagged values are denoted by the letters p and q, respectively. In the above model, short-run dynamics are represented by a differenced lag of explanatory variables, and the variables without the difference represent long-run dynamics. Lag lengths of variables are different since the ARDL method allows using variables with different lag lengths.

The above equations are tested for Sri Lanka using eight variables. The Gini coefficient (GINI), which has been used as a proxy for income inequality globally for a long time, is the dependent variable in the model and serves as a representation of income inequality in Sri Lanka. The model uses seven explanatory variables that are based on both theoretical and empirical research. In this regard, GDP per capita (PGDP) is chosen since it is frequently regarded as a general indicator of the average living conditions or financial security of people in society. Theoretically, it is said that trade openness (TO), which measures the actual size of the registered imports and exports of the country, help reduce 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 enhances the real income of the poor and there in reduces inequality (Hamori & Yohihiro, 2012). The choice of the average price level (P) as a variable is based on its direct impact on consumption. Some studies have argued that price hike directly reduces the disposable income of the people disregarding their income status; therefore, inequality reduces (Bulier, 1998), while some other have explained that inflation forces to reduce working hours and hence, reduce income (Fischer, 1993; King and Wolman, 1996). government expenditure (GE), on the other hand, is an essential factor for inequality. Transfers in GE help enhance 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 areas in Sri Lank (Refer 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 in the model helps identify its impact on inequality as well. Secondary school enrollment ratio (SER) is also vital as it is said that educational attainments help reduce income inequality among households in some parts in Sri Lanka (Deshapriya, 2017; Gunatilake et al. 2006); therefore, it is included in the model to recheck the validity of previous findings.

Annual data from 1978 to 2021 that are collected from secondary sources are used for the analysis. The time frame is decided because the study used 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 examined 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:

$$\Delta GINI_t = \alpha_{10} + \alpha_{11}GINI_{t-1} + \alpha_{12}PGDP_{t-1} + \alpha_{13}TO_{t-1} + \alpha_{14}FD_{t-1} + \alpha_{15}P_{t-1}$$

$$+ \alpha_{16}GCE_{t-1} + \alpha_{17}AGRI_{t-1} + \alpha_{18}SER_{t-1} + \beta_{11}\sum_{i=1}^{p}\Delta GINI_{t-i}$$

$$+ \beta_{12}\sum_{i=0}^{q}\Delta PGDP_{t-i} + \beta_{13}\sum_{i=0}^{q}\Delta TO_{t-i} + \beta_{14}\sum_{i=0}^{q}\Delta FD_{t-i}$$

$$+ \beta_{15}\sum_{i=0}^{q}\Delta P_{t-i} + \beta_{16}\sum_{i=0}^{q}\Delta GCE_{t-i} + \beta_{17}\sum_{i=0}^{q}\Delta AGRI_{t-i} + \beta_{18}\sum_{i=0}^{q}\Delta SER_{t-i}$$

$$+ \varepsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

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 ($H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq 0$), 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:

$$\Delta GINI_t = \beta_{10} + \beta_{11}\sum_{i=1}^{p}\Delta GINI_{t-i} + \beta_{12}\sum_{i=0}^{q}\Delta PGDP_{t-i} + \beta_{13}\sum_{i=0}^{q}\Delta TO_{t-i} + \beta_{14}\sum_{i=0}^{q}\Delta FD_{t-i}$$

$$+ \beta_{15}\sum_{i=0}^{q}\Delta P_{t-i} + \beta_{16}\sum_{i=0}^{q}\Delta GCE_{t-i}$$

$$+\beta_{17} \sum_{i=0}^{q} \Delta AGRI_{t-i} + \beta_{18} \sum_{i=0}^{q} \Delta SER_{t-i} + \mu_{11} ECM_{t-1}$$

$$+ \eta_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

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

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 stationary as the proposed ARDL method cannot be utilized if any variable became stationary at their second differenced- I(2). Therefore, unit root test is carried out to check the level of stationary 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 (0.0185)**	-3.485163 (0.0547)**	TO	-1.638645 (0.7594)	-4.861962 (0.0018)***
PGDP	0.592673 (0.9992)	-4.643776 (0.0032)***	FD	-2.625340 (0.2718)	-4.456314 (0.0053)***
GE	-2.075246 (0.5433)	-4.493877 (0.0048)***	AGRI	-2.467613 (0.3415)	-5.045410 (0.0011)***
P	-1.036662 (0.9270)	-3.865059 (0.0233)**	SER	-1.800432 (0.6853	-4.206068 (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: Authors own estimations

All variables become stationary at their first difference, according to the Augmented Dickey-Fuller (ADF) test results, with the exception of GINI, which is stationary at its level. None of them exhibit second order stationary I(2), hence the ARDL approach may be used.

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 & 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) have shown a positive and significant, emphasizing openness induces income inequality, which is contrast to the findings of Perera at. al. (2004) and Hamori & Yohihiro (2012). However, Perera et. al. (2004) 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, the findings suggest that average prices (P) have the tendency to lessen income inequality. However, the connection between inflation and inequality lacks a firm theoretical foundation. Although some studies have claimed that inflation lowers income inequality (Bulier, 1998; Maestri & Roventini 2012; Monnin 2014), this is because inflation lowers the average wealth of the population, which can have some implications on income inequality. The empirical literature in this area is also yielding mixed results. Galli and van der Hoeven (2001) also found that growing inflation is linked to both an increase and a decrease in inequality, depending on the starting inflation rate. This can be the current situation in Sri Lanka.

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 (Johnston and Mellor 1966, Rains et al. 1990, World Bank 2008, 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 and Chen 2007) 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. 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 and Chen 2007) which is a condition that is valid to Sri Lanka as well[3]. Most of the rural population is stills engaged in agriculture and the country's main exports consist of agricultural product[4]

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[3] Agricultural statistics have shown that the sectoral contribution of agriculture to the GDP is gradually declining in Sri Lanka; however, it is still the main income-generating activity in most of the rural population. Thus, development occurs in the agricultural sector benefits rural poor

[4] After 2019 and till now, Sri Lanka has been experiencing a high inflation rate, which started with Covid-19 pandemic-led supply shortage. After that, global energy price hikes and severe foreign currency shortages in the

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).

Lastly, although secondary school enrolment (SER) seems to have a beneficial impact on income inequality in Sri Lanka, the correlation is not statistically significant. The finding, however, goes against most of the existing literature, which emphasized that, in many countries, a greater secondary school enrolment ratio reduces income disparity (Bourguignon & Morrisson 1990, Barro 2000, Alderson & Nielsen 1995). In contrast, the result of the present analysis supports some. In contrast, the result of the present analysis supports some of the findings that claim that secondary school enrollment induces income inequality (Milanovic & Square, 2005; De Gregorio & Lee 2002). 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, inequality increases as communities have higher average levels of higher education per individuals. 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: Authors' own estimation

country caused another supply shortage of food and fuel which led to significant price hikes in food and fuel; therefore, the comment on single-digit inflation cannot be applied to the present Sri Lankan scenario.

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
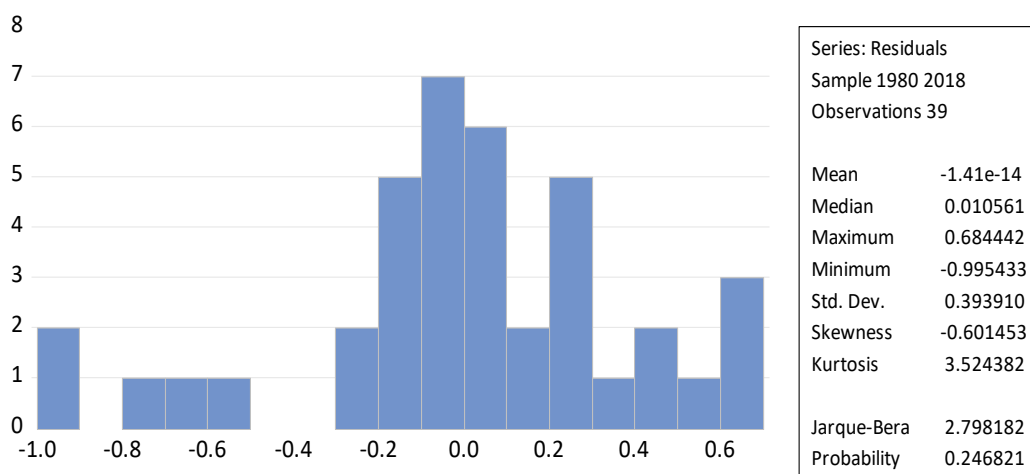
The adjusted R2 was 0.66, indicating that 66 percent of the variation of the response variable explained in the model, which is a good sign that indicates the model is good fit, while the residual autocorrelation test indicates the absence of serial correlations among residuals. In addition, CUSUM and CUSUM of Square test indicated that the model is stable at 5 percent significant level.
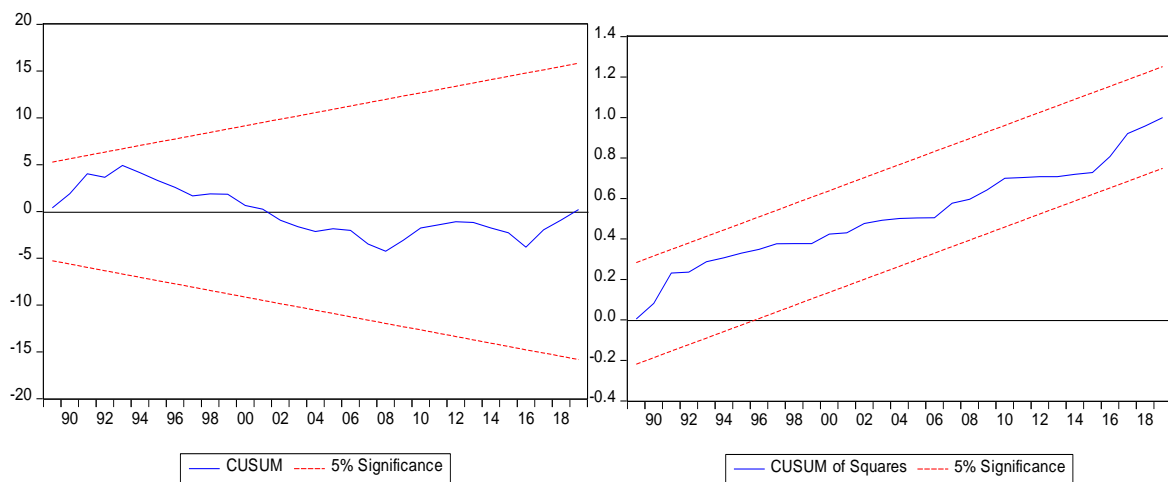
Figure 2 – Results of CUSUM and CUSUM of Squired Test

Source: Authors' own estimation.

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

Series: Residuals	
Sample 1980 2018	
Observations 39	
Mean	-1.41e-14
Median	0.010561
Maximum	0.684442
Minimum	-0.995433
Std. Dev.	0.393910
Skewness	-0.601453
Kurtosis	3.524382
Jarque-Bera	2.798182
Probability	0.246821

Figure 3- Residual Diagnostic Test

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 is not practical.

Data (and Software) Availability
Data are available upon request
Consent for Publication
We do not have any person's data in any form.
Competing Interests
 The author declares that there are no competing interests in this work
Grant information: The author declared that no grants supported this work.

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