

## **Macroeconomic and Demographic Factors Affecting on Income Inequality in Sri Lanka: A Regression Analysis**

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### **Abstract**

Income inequality is one of the major concern in the Sri Lankan economy for the last three decades. This research aims to identify the impact of macroeconomic, demographic and political economy factors on income inequality over the period time 1990 to 2017. This research has used secondary data and analyzed by using Ordinary Least Square Model (OLS). According to the results, this study concludes that GDP per capita, CPI, education expenditure, inflation and manufacture have a positive and significant impact while unemployment has a negative impact on income inequality in Sri Lanka. Although labour force negatively related to income inequality and it is not a significant variable. Hence, this study concludes that estimated factors affect the income inequality of Sri Lanka. This study suggests that the government must promote policies to reduce income inequality and to increase the employment level and income, especially in the agriculture sector. And also, Policymakers should focus on promoting the monetary policy and allocating recourse efficiently for the sustainable growth of the country to reduce income inequality.

**Keywords:** Demographics, Gross Domestic Product, Income inequality, Macroeconomic

### **1. Introduction**

The economic development of a country depends on the economic growth and improvements in the living standard of the people. Here, the living standard is determined by the income distribution and economic growth of a country. Income distribution is one of the central concern of economic policy and economic theory. Therefore, classical economists such as Adam Smith, Thomas Malthus and David Ricardo were mainly concerned with the distribution of income between the main factors of production, land, labour and capital. But, unfortunately, income inequality and disparities between the individuals and societies lead to the extreme poverty and insufficient allocation of assets of an economy. That's why reducing income inequality and eradicating extreme poverty are two important goals expected to be achieved by 2030 under the Sustainable Development Goals (SDGs).

Inequality is defined as the difference between the standard of living across a population (Gallo, 2002). Inequalities create the vicious cycle of poverty, political instability and conflicts. Moreover, it leads to the slow economic growth and development of a country. There are various types of inequalities such as income, gender, wealth, health education and access to services (water, electricity, improved sanitation etc.). Among this, income inequality is the most popular one. Therefore, income inequality refers to the disparities in income between the rich and poor or have and have not.

Gini coefficient is most widely used to measure income inequality of an economy or a country. It is defined as the ratio of the area between the diagonal and the Lorenz curve to the total area of the half-square in which the curve lies (Todaro & Smith, 2002). Gini coefficient is estimated between 0 and 1. The lower value of the Gini coefficient shows the equal distribution of income and higher value indicates the income inequality.

In developing countries, income inequality increased by 11 percent in developing countries between 1990 and 2010 (UNDP, 2014). According to the United Nations Development Report, in 2014 more than 75 percent of the household population are living in a society where income is more unequally distributed. At the same time, income inequality in Organization for Economic Co-operation and Development (OECD) countries are also high for the past half-century. The average income of the richest 10 percent of the population is about nine times higher than the 10 percent of poorest across the OECD. Moreover, OECD examines that globalization, skill-biased technological change and changes in countries' policy approaches are drivers of growing inequalities. And it evaluates that the effectiveness and efficiency of a wide range of policies, including education, labour market and social policies will reduce the poverty and income inequality and promote more inclusive growth (oecd.org, 2017).

Income inequality in Sri Lanka is high and has remained unchanged for more than three decades (Wimal Nanayakkara, 2016). Less than 2 percent of household income is shared by only 10 percent of the poorest households. But, 10 percent of the richest household share the 38 percent of household income throughout the period from 1990/91 to 2012/13 (Household Income and Expenditure Surveys, 2013). Moreover, the Gini coefficient for household income also increased from 0.43 in 1990/91 to 0.49 in 2006/07. And also, the Gini coefficient has remained unchanged as 0.48 thereafter.

Although, during the last three decades developing countries including Sri Lanka managed to reduce poverty and develop the economy. But, income inequality is still a major barrier to achieve macroeconomic goals of a country. In this context, this research will focus on the impact of macroeconomic and demographic factors on income inequality in Sri Lanka in the period of 1990- 2017.

## **2. Problem Statement**

Income inequality in Sri Lanka is high and has remained unchanged for more than three decades (Wimal Nanayakkara, 2016). Less than 2 percent of household income is shared by only 10 percent of the poorest households. But, 10 percent of the richest household share the 38 percent of household income throughout the period from 1990/91 to 2012/13 (Household Income and Expenditure Surveys, 2013). Moreover, the Gini coefficient for household income also increased from 0.43 in 1990/91 to 0.49 in 2006/07. And also, the Gini coefficient has remained unchanged as 0.48 thereafter. So, this research tries to find out the impact of factors on income inequalities in Sri Lanka.

## **3. Research Objectives**

The main objective of this research is to examine the impact of macroeconomic, demographic and political economy factors on income inequality in Sri Lanka. Specifically, this research is designed to:

- a) Test the relationship between the determinants and income inequality in Sri Lanka.
- b) Examine macroeconomic, demographic and political economy factors of income inequality in Sri Lanka.
- c) Suggest appropriate and efficient policy conclusions that can aid the reduction of the inequality gap in Sri Lanka based on our findings.

## **4. Literature Review**

The literature of this paper is with the numerous studies that reflect the empirical relationship between economic growth and income inequality. Initially, Adinde (2017) in her study described that Kuznets inverted-U curve does not hold for Nigeria and GDP, Consumer Price Index, population growth and

education are determinants of income inequality in Nigeria. As well as, the research indicates that a negative relationship between economic growth and income inequality.

Deyshapriya (2017) examined that macroeconomic determinants of income inequality using dynamic panel data analysis based on the generalized method of moments over 1990-2013 across 33 Asian countries. This study found that an initial increase in GDP redistributes income from the bottom 20% of people to the middle class and richest groups. Further, increased in GDP redistributes the income from the top 20% to middle income and poor groups. Similarly, Unemployment, inflation, terms of trade and ODA are significant factors on income distribution among Asian countries.

Further, Munir et al, (2017) tested that macroeconomic variable such as per capita GDP, government consumption expenditure, fertility rate, value addition by the agricultural sector, per capita arable land, urban population and globalization determine the income inequality of India and Pakistan. And results of this study show that positive relationship between income inequality and per capita GDP. Majeed (2016) estimated that income inequality has a significantly positive influence on the economic growth of Pakistan and poverty has a negative influence on growth.

Perara et al, (2014) their results indicate that overall income inequality and income inequality among different household groups in the urban, rural and estate sectors in Sri Lanka would fall under both trade liberalization policies. Foster, Greer and Thorbecke indices reveal that poverty would also decline in all three sectors. In both instances, unilateral trade liberalization delivers the greatest reductions. Skare et al. (2014) empirically estimated that CPI, employment, labour force and population are the important determinants of income distribution and income inequality. There is a direct link between the determinants that affect household disposable income and thereby on their income. Further, there is a large difference in income distribution measured by household consumption for different classes.

Cheema et al, (2012) examined those long-run relationships between poverty, income inequality, and growth in Pakistan using fixed effects/random-effects models. According to the research findings, growth and inequality play significant roles in affecting poverty, and growth has a significant positive impact on inequality. Thus, the absolute magnitude of net growth elasticity of poverty is smaller than that of gross growth elasticity of poverty. Gunatilaka et al, (2006) investigated that changes in access to infrastructure triggered much of the shift as a result of the concentration of people shifted towards higher income ranges at every stage in the distribution between 1985 and 2002 in Sri Lanka. Higher levels of educational attainment also had an impact on income distribution. But the middle classes benefited disproportionately more from the provision of education and infrastructure services than the poor.

Karunaratne (2000) investigated that the age income of receivers determines the income inequality in Sri Lanka at sectoral, regional, and national level during the period 1963 – 87. And also, this research found that elasticity of the Gini coefficient for different age groups, increasing the relative income share of the under 35 age groups can reduce the income inequality and over 35 age groups will lead to increase in income inequality in Sri Lanka. Kamel (nd.) study states that income distribution of Pakistan is determined by the employment structure, distribution of the labour force within various industrial and occupational groups and relative incomes in various industries and occupations. This study outlines a strategy for improving income distribution.

The available literature review address that links between the very limited macroeconomic factors. Namely, GDP, poverty, inflation and unemployment. Further, the researches which are conducted in Sri Lanka, those found how age groups and infrastructure development determine the income distribution and inequality in Sri Lanka. Hence, those highlights the gap which should fill.

Therefore, in this study, not macroeconomics factors alone, but demographic and political factors have also been used as a key factor of income inequality.

## 5. Research Methodology

### 5.1 Data Collection

The study is conducted in the quantitative and qualitative method through secondary data such as journals, research articles, books and reports. Income inequality is measured by the Gini index. The data for the Gini index is collected from Household Income and Expenditure Surveys Report and World Income Inequality Database (WIID). Further, the Gini index includes various missing values, to encounter this issue the data is calculated through the median method. Data for macroeconomic variables are taken from the Annual Report of Central Bank of Sri Lanka and a popular statistics database website called Knoema. The study is conducted with time-series data from 1990 – 2016 survey periods and this will enable to find out the objective of this research. This study is estimated a multiple linear regression model where the Gini coefficient is the dependent variable. Moreover, to avoid the variable specification bias, this study included other macroeconomic, demographic and political economy variables which have an impact on income inequality. The collected data is analyzed using the ordinary least squares (OLS) method in the Statistical Package for the Social Sciences (SPSS).

### 5.2 Methodology and Model Specification

The multiple regression analysis is a statistical technique in social sciences which is used to analyze the relationship between dependent and independent variables. This analysis aims to find the mathematical relation to explain the Y in terms of X. Hence, this relationship is shown as  $Y = f(X)$ . Further, in the estimation, observed data is modelled as:

$$Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_n x_{in} + \varepsilon_i$$

Where,  $\beta_0, \beta_1, \beta_2, \dots, \beta_n$  are regression coefficients (parameters) and  $\varepsilon$  represent the error term.

In this study, Regression Analysis is used to observe the impact of factors on income inequality. This study used the following model to determine the macroeconomic, demographic and political economy determinants of income inequality. In this model GDP per capita, manufacture, inflation, unemployment and capital formation are used as macroeconomic factors. Also, this study is used the education expenditure and labour force as a demographic factor and Corruption Perception Index as a political economy factor.

$$LGINI = \beta_0 + \beta_1 LPCGDP_t + \beta_2 LMANU_t + \beta_3 LEDEXP_t + \beta_4 LINF_t + \beta_5 CF_t + \beta_6 LLAB_t + \beta_7 LUNEMP_t + \beta_8 LCPI_t + \varepsilon$$

This study has used following macroeconomic, demographic and political economy factors. Where,

Gini coefficient (GINI) is used to measures income inequality in Sri Lanka. Gross domestic per capita growth (PCGDP) is used as a proxy for the economic growth of Sri Lanka. Manufacturing (MANU) measures the share of the manufacturing sector to total GDP. This is the proxy of sectoral transformation. During the process of economic growth, the economy move from the agricultural sector to service and manufacturing sector. Education expenditure (EDEXP) as a percentage of GDP is used as a proxy of human capital. Inflation rate (INF) is used to measure the level of inflation in Sri Lanka.

Capital Formation (CF) is used as a proxy for investment. Unemployment (UNEMP) is used as a total unemployment rate in Sri Lanka. Corruption Perception Index (CPI) is used as a proxy of political economy. Labour (LAB) is a proxy of the labour force participation rate.  $\epsilon$ : Error term.

## 6. Results And Discussion

The Ordinary Least Square in Multiple Regression Model has used to observe the impact and relationship between the macroeconomic, demographic and political economy variables. Following models are used to select the best model. Namely, Linear-Linear, Linear-Log, Log-Linear and Log-Log models. According to the findings of this study, Log - Log model has been selected as the best model based on 'P' value, VIF, Durbin- Watson and significant variables.

**Table 1. Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
LGINI	28	3.48	3.71	3.6122	.08312
LPCGDP	27	.74	2.05	1.4474	.35293
LLAB	28	3.87	3.99	3.9196	.04050
LCPI	28	3.36	3.69	3.4892	.09166
LUNEMP	28	1.39	2.77	2.0255	.44119
LEDEXP	28	.26	1.06	.7345	.20318
LINF	28	1.16	3.07	2.0959	.47640
LMANU	28	3.24	3.42	3.3188	.05477
LCF	28	3.09	3.67	3.2965	.14389
Valid N (listwise)	27				

Source: Computed in SPSS

Table 1. shows the descriptive statistics for the variables applied in this study. Descriptive statistics of the variables explain the mean, maximum and minimum with their Standard deviations in this study. GDP per capita had a mean of 3.6122 with a standard deviation of 0.08312. Manufacturing recorded a mean of 3.3188 with a standard deviation of 0.05477. Inflation and capital formation resulted in a mean of 2.0959 and 3.2965 with a standard deviation of 0.47640 and 0.14389 respectively. Labour recorded a mean of 3.9196 with a standard deviation of 0.04050 while education expenditure had a mean of 0.7345 and standard deviation of 0.20318. Further, CPI had a mean of 3.4892 with a standard deviation of 0.09166.

**Table 2. Correlation Matrix of the Variables**

	LGINI	LPCGDP	LLAB	LCPI	LUNEMP	LEDEXP	LINF	LMANU	LCF
LGINI	P.C 1.000								
	Sig. .								

LPCGDP	P.C	-.077	1.000							
	Sig.	.351	.							
LLAB	P.C	.293	-.341	1.000						
	Sig.	.069*	.041	.						
LCPI	P.C	.722	-.468	.643	1.000					
	Sig.	.000**	.007	.000	.					
LUNEMP	P.C	-.695	.142	-.620	-.775	1.000				
	Sig.	.000**	.240	.000	.000	.				
LEDEXP	P.C	-.320	.137	-.367	-.436	.594	1.000			
	Sig.	.052*	.248	.030	.012	.001	.			
LINF	P.C	-.303	.179	-.343	-.516	.609	.245	1.000		
	Sig.	.062*	.185	.040	.003	.000	.109	.		
LMANU	P.C	.722	.042	.169	.375	-.619	-.510	-.209	1.000	
	Sig.	.000**	.418	.200	.027	.000	.003	.148	.	
LCF	P.C	.357	-.187	.608	.649	-.814	-.538	-.419	.422	1.000
	Sig.	.034**	.175	.000	.000	.000	.002	.015	.014	.

Source: Computed in SPSS

P.C: Person Correlation, Sig. : Significant (2 tailed)

Note: \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

According to table 2. Person correlation was employed to analyze the level of association between the GINI coefficient and its explanatory variables. The result describes that there is a weak negative and insignificant correlation of GDP per capita with GINI. There is a weak positive association of labour with GINI coefficient. The correlation between GINI and CPI strong and significant. There is a strong negative and significant correlation between GINI and unemployment. There is a weak negative association of education expenditure with GINI in a significant manner. Association of inflation with GINI is weak and negative. It is significant. There is a strong positive correlation between manufacturing and this correlation is significant. This study shows that capital formation has a weak positive association with GINI in a significant manner.

Although the independent variables correlated with each other, the correlation was not strong to cause Multicollinearity. This implies that there is no Multicollinearity among the independent variables. Therefore, this independent variable can be used as factors of income inequality in Sri Lanka in regression analysis.

**Table 3. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.965 <sup>a</sup>	.931	.901	.02651	2.091

Source: Computed in SPSS

- a. Predictors: (Constant), LCF, LPCGDP, LINF, LMANU, LEDEXP, LLAB, LCPI, LUNEMP  
 b. Dependent Variable: LGINI

According to Table 3. R<sup>2</sup> coefficient of determination is (0.931) which indicates that the independent variables: GDP per capita growth, manufacture, inflation, education expenditure, labour, unemployment, capital formation and CPI explain 0.931 percent of the variation in income inequality of Sri Lanka. Further, R<sup>2</sup> the coefficient of determination explains how much linear relationship has the dependent variable with independent variables. Also, results revealed that there exists a strong relationship among the selected independent variables and income inequality as shown by the correlation coefficient 0.965 (R= 0.965). Moreover, a higher value of coefficient indicates the better good of the fit. The Durbin Watson statistics is 1.529 which indicates that there is no problem of autocorrelation in this Log – Log regression model.

**Table 4. ANOVA**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.172	8	.021	30.541	.000 <sup>b</sup>
Residual	.013	18	.001		
Total	.184	26			

Source: Computed in SPSS

- a. Dependent Variable: LGINI  
 b. Predictors: (Constant), LCF, LPCGDP, LINF, LMANU, LEDEXP, LLAB, LCPI, LUNEMP

The significance value is 0.000 which is less than p-value 0.05. This explains that the model is statistically significant in predicting how GDP per capita, labour, manufacture, inflation, unemployment, capital formation, CPI and education expenditure affect the income inequality in Sri Lanka. Given 5 percent level of significance and computed F value as 30.541. This confirms that overall the multiple regression model is statistically significant. And it is a suitable prediction model to explain how macroeconomic, demographic and political economy factors affect the income inequality in Sri Lanka.

**Table 5. Significant of Variables**

Predictor	Coefficient	T Value	Significant (P Value)	VIF
(Constant)	.981	.882	.389	
LPCGDP	.037	1.949	.067*	1.624
LLAB	-.303	-1.611	.125	2.181
LCPI	.728	6.599	.000**	3.921
LUNEMP	-.102	-2.823	.011**	9.800
LEDEXP	.081	2.425	.026**	1.719
LINF	.037	2.447	.025**	1.895

LMANU	.683	4.901	.000**	2.211
LCF	-.293	-4.315	.000**	3.377

Source: Computed in SPSS

a. Dependent Variable: LGINI

Note: \*\*\* Significant at 1%, \*\* Significant at 5%, \* Significant at 10%

The Probability Value (P- Value) is used as an indicator of the significance of the relationship between the dependent and independent variables. When a p-value is less than the 0.05 (at 95 percent significance level), it is implied as a measure of the statistical significance. At the same time, p-value above the 0.05 indicates a statistically insignificant relationship between the dependent and independent variables. Based on the table, the following regression equation is estimated:

$$LGINI = 0.981 + 0.037LPCGDP_t + 0.683 LMANU_t + 0.081 LEDEXP_t + 0.037LINF_t - 0.293 CF_t - 0.303LLAB_t - 0.102 LUNEMP_t + 0.728LCPI_t + U$$

This model has found that there is a significant and positive relationship between income inequality and GDP per capita in Sri Lanka. This shows that as GDP per capita increases in Sri Lanka income inequality also increases and vice versa. Similar results were found by Adinde, (2017) and Munir & Sultan, (2017).

Inflation is positively related to income inequality (0.037). Also, it is statistically significant. Adinde (2017) and Majeedh (2016) also found that a positive relationship between inflation and income inequality. Inflation is one of the major cause which determines the purchasing power of the people. In Sri Lanka, the price level is not stable. Although in recent years it declines, now inflation has increased due to currency depreciation, high oil price and political instability.

Labour has a negative relationship with income inequality. But, it is not a significant variable. Abinde (2017) also proved the negative association between labour and income inequality. Unemployment suggests a negative and significant relationship with income inequality in Sri Lanka. It means when unemployment increases income inequality will decrease. This is practically impossible. This result may be the inefficient resource allocation and unskilled labour force.

Education expenditure is used to measure human capital. These results suggest a positive and significant impact on income inequality. Education expenditure leads to improve the productivity and efficiency of the labour force and helps to get better job opportunities and higher income. Unfortunately, who live in an urban area, they only got better educations than the rural and state people. Gunatilake, et. al. (2006) and Majeedh (2016) also proved the positive association between education and income inequality.

The manufacture has a significant and positive impact on income inequality. It shows that an increase in the manufacturing sector of Sri Lanka will cause income inequality to increase. In Sri Lanka, most of the manufacture they live in an urban area. Therefore, they earn more money income than rural and estate people. As a result of this their living standard also higher. Further, manufactures and who work in manufacturing sectors earn higher income as compare to the workers who work in the agricultural sector. Abinde (2017) also got the same result.

Corruption Perception Index is used to check the impact of political economy on income inequality. The estimated coefficient of this variable indicates a significant positive impact on income inequality. It means



that as the CPI increases income inequality will increase. Because corruption leads to low productivity and inefficient allocation. As a result of this, the economic growth of a country also falls

## **7. Conclusion**

Income inequality is one of the major concern in the Sri Lankan economy for the last three decades. It slows the economic growth of a country and leads to the extreme poverty between the people and rises the income gap between the poorest and richest.

This study found that the macroeconomic, demographic and political economy variables as determinants of income inequality in Sri Lanka. This study estimated that GDP per capita, unemployment, capital formation, inflation and manufacture are macroeconomic factors which are determined and affect the income inequality in Sri Lanka. And also, this study examined that education expenditure and labour force as a demographic factor and corruption perception index as a political economy factor of income inequality in Sri Lanka. According to the results, this study concludes that GDP per capita, CPI, education expenditure, inflation and manufacture have a positive and significant impact while unemployment has a negative impact on income inequality in Sri Lanka. Although labour force negatively related to income inequality, it is not a significant variable.

## **8. Suggestions And Recommendation**

The government must promote policies which reduce income inequality in Sri Lanka, especially in the agriculture sector. As an agricultural country, Sri Lanka should increase agricultural productivity by introducing new technologies and techniques. Consequently, workers who engaged in agriculture can earn more income, rural youth will get the new employment opportunities and farmers can set up agro-based industries. At the same time, the government should improve the infrastructure facilities in a rural area. Then, that will create marketing facilities for the production of rural people.

## **Acknowledgement**

I would like to express my special thanks of gratitude to all my colleagues and other persons who supported for their valuable comments and suggestions to conduct this research.

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