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## Poverty and Corruption in Sri Lanka: An ARDL Bound Testing Technique and Error Correction Model

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### ABSTRACT

The objective of this research paper is to empirically investigate the impact of corruption on poverty in Sri Lanka over the period 1996-2016 using the secondary data. ADF unit root test was applied to check the variables stationary and an ARDL bound testing approach is used to investigate co-integration among the study variables such as poverty, corruption, economic growth, FDI, inflation and population. The results of ARDL test confirmed that there is a long run relationship among poverty, corruption, and other explanatory variables of poverty over the study period. The long-run estimates indicate that Corruption, GDP, foreign direct investment, and inflation rate have impact on poverty. It revealed that a 1 percent increase in corruption would increase the poverty rate by 0.726 percent in the long run and 1 percent rise in corruption would increase the poverty rate by 0.601 percent in the short run. As a result, the government should pursue policies that will substantially reduce corruption, thereby the government policy implication should focus on reduce the corruption to improve the standards of living to eliminate poverty in Sri Lanka.

**Keywords:** Corruption perception Index, Poverty, GDP, Inflation, ARDL, Error Correction Model

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## 1.Introduction

Corruption is one of the most pressing issues confronting the modern world. It stifles good governance, distorts public policy, causes resource misallocation, and impacts the private and public sectors' growth. Corruption is both a source of poverty and an obstacle to reducing poverty. It has the potential to derail developed countries' attempts to reduce poverty. One of the main determinants of poverty is corruption. As a result, combating corruption is an essential part of the poverty reduction process. Corruption exacerbates the poor's living standards by distorting the whole decision-making process associated with public-sector services. Corruption exacerbates poverty through obstructing constructive services such as education and health care in favor of broader capital-intensive programs that offer better opportunities for illicit income extraction. In developing countries, on the other hand, social and wealth disparities exacerbate power imbalances and promote corruption (Ndikumana, 2006).

Corruption, according to Transparency International, is described as the use of one's public position for illicit private benefit. Power abuse and personal benefit will happen in both the public and private sectors. The World Bank implemented the most widely accepted and straightforward concept of corruption. Corruption is described as "the misuse of public power for private gain." It should not be implied from this concept that corruption cannot occur in the private sector.

The World Bank Institute reports that bribes total more than US\$1.5 trillion each year, with the developing world suffering an annual expense of approximately US\$80 billion. Corruption stifles market creation, discourages investment, raises uncertainty and the cost of doing business, lowers competition, undermines the rule of law, and erodes the institutional structures that support economic growth.

In developing countries like Sri Lanka, corruption and poverty are conceptually linked problems. In any economy, both are regarded as unquestionably monumental disasters. Poverty has been experienced at various levels in many developed countries. Corruption is described as a harmful infection that attacks the basic structures required for the dynamic functioning of the general public in Sri Lankan society. It is a global problem that stifles economic growth and limits development opportunities. It's a symptom and outcome of institutional failure and it has a negative impact on economic development. (Ugur et al, 2011). Good Sri Lanka has faced and spectacularly struggled to deliver on governance for the majority of its modern history. This problem is structural, affecting all spheres of society: socioeconomic, political, judicial, cultural, artistic, and scientific. Corruption has been a problem in almost every country on the planet.

Facing policy and political promises, Sri Lanka's performance on the new Corruption Perceptions Index has remained unchanged, suggesting that the public's perception of state sector governance has remained unchanged. The Corruption Perceptions Index (CPI) 2019, which was launched by Transparency International Sri Lanka, ranks Sri Lanka 93rd out of 180 countries. Sri Lanka was given a 38 out of 100 ranking, which was the same as in 2018 and 2017. Sri Lanka was given a score of 36 in 2016. However, from 95th out of 176 countries in 2016, the country rose to 91st out of 180 countries in 2017 and 89th out of 180 countries in 2018.

In this context, the effect of corruption on poverty is an important issue both of economists and politicians in Sri Lanka. The problem of corruption in economies causes living standard of people. As a result, it is very important to investigate the impact of corruption on the poverty. When reviewing of the literature, this study has explained an empirical study of the relationship between corruption and poverty and also able to provide valuable evidence to researchers. Therefore, this research paper empirically examines the impact of corruption on poverty in Sri Lanka and proposes potential strategies for addressing the issue of corruption to minimize or eliminate poverty in the country.

### **Objective**

The main objective is to find the corruption impact on poverty in Sri Lanka.

The specific objectives,

To investigate the short-run impact of corruption on poverty.

To find out the long-run impact of corruption on poverty in Sri Lanka

## **2.Review of Literature**

There are number of studies done by other researchers on the relationship between corruption and poverty using different methods in different countries. World bank (2000) reported whether there is any obvious correlation relationship between corruption and income inequality in Eastern Europe and Central Asia. The results revealed that decreasing rate of corruption have statistically correlated with lower levels of income inequality meanwhile, the cost of corruption impose a greater burden on small scale of firms.

Karstedt (2001) compared corruption to income distribution in OECD nations. This result reveals that and corruption has declines rate because of higher secondary education and a high proportion of women are engaged with government roles. Therefore, the corruption and income inequality has nonlinear relationship, which means that once countries achieve a certain degree of income inequality and corruption decreases exponentially.

The literature on poverty, this issue has a strong influence on society. In this sense, strategies to reduce poverty become more common because of societal income inequality being addressed. Drury et al (2006) examined that poverty as an epidemic and it may also contribute to more corruption. Corruption is characterized as the misappropriation of public power for monetary gain by a person or group. Bribery, nepotism, fraud, and other misuses of public funds are included in this definition.

Iwasaki and Suzuki (2012) revealed that economic, political, and cultural factors that influence corruption in transition economies. Poverty has been identified as a source of corruption in the literature, in addition to these variables. Despite the difficulty in identifying and calculating poverty, it commonly refers to the most households with a total income of less than half or two-thirds of average income (Townsend, 1962).

Negin et al (2010), used the Granger causal and dynamic panel method GMM estimators to test the causal relationship between poverty and corruption in 97 market economies from 1997 to 2006. It revealed that poverty have positively significantly impact on corruption.

When studying its consequences in scientific literature, there are several studies referring to the positive or negative effects of corruption on certain variables. (Koyuncu& Yilmaz, 2009; Ayaydın&Baltacı, 2013;

Ayaydin&Hayaloglu, 2014). In general, the higher the degree of systemic corruption, the higher the rates of inflation and public debt. This is due to an excessive rise in monetary growth and government spending (Blackburn & Powell, 2011).

Cooray and Schneider (2013) and Topal and Keyifli (2016) estimated a positive relationship between corruption and public debt, while Al-Marhubi (2000) reported a positive relationship between corruption and poverty. The corruption has a negative impact on inflation Economic growth and foreign direct investment.

Rent-seeking theory and Rose-theories Ackerman's also contribute to the relationship between corruption and income inequality (1978). According to Lambsdorff (1999), the benefits of corruption are possible to favor the well-connected at the expenditure of the poor. According to Gupta et al (1998), As measured by the Gini coefficient, corruption increases income inequality. Although accounting for various other exogenous variables, a major positive effect of corruption on inequality was discovered in a cross-section of 37 countries. N'zue and N'Guessan (2005) used a panel data of 18 countries from 1996 to 2001 to study the causality relationship between poverty and corruption. According to empirical evidence, poverty as calculated by the Human Development Index (HDI), which does not cause corruption, and corruption does not cause poverty. The findings demonstrate unidirectional causality as poverty is calculated by income inequality. In other words, corruption does not cause inequality, but inequality causes corruption. On the opposite, Negin et al. (2010) examine the Granger causal association between poverty and corruption. Their observational studies, based on a survey of 97 developed countries from 1997 to 2006, show that corruption and suffering go hand in hand, with bidirectional causality. Poverty was calculated in their analysis using the Human Poverty Index (HPI).

Using panel data from 154 countries from 2000 to 2013, Unver, M (2016) investigates the impact of poverty on corruption. According to the findings, poverty variables and inflation rates, as well as levels of democracy, have statistically significant and positive effects on corruption, while FDI, trade transparency, and levels of democracy have statistically significant and negative effects.

Despite the fact that many studies have been undertaken to examine the relationship between corruption and poverty, the issue of whether such a relationship exists in the short and long run has received less attention. As a result, policy recommendations for fighting poverty and corruption could simply be incorrect. Taking it to its logical conclusion, how good is it for Sri Lanka to try to reduce corruption by adopting anti-poverty policies if the high poverty level is caused by high corruption.

There has been a lot of empirical work done to investigate the relationship between corruption, inequality, and economic growth using panel style research, no study has been performed to explore such a relationship for Sri Lanka. The current analysis fills this gap by looking into the relationship between corruption and poverty in Sri Lanka.

### 3. Research Methodology

This study uses annual data covering the period 1996 -2016 and data were extracted from annual report of central bank of Sri Lanka and the World Bank. Below table represents the variables used in this study:

**Table 1. Variables Description and Data Sources**

Variables	Explanation	Data Sources
lnpov	poverty head count ratio	Central Bank of Sri Lanka
lnpci	corruption perception index	Transparency International
lnfdi	foreign direct investment	WDI
lngdp	gross domestic product at market price	Central Bank of Sri Lanka
lninf	Inflation rate	Central Bank of Sri Lanka
lnpop	population	Central Bank of Sri Lanka

### 4. Model Specification

To estimate the relationship among the dependent and independent variables, an econometric method is employed for the study.

$$lnpov_t = \beta_0 + \beta_1 lnpci_t + \beta_3 lngdp_t + \beta_4 lninf_t + \beta_5 lnpop_t + \beta_6 lnfdi_t + \mu_t \tag{1}$$

Where CPI is corruption perception index, POV is poverty head count ratio, GDP is gross domestic product at market price, INF is inflation rate, POP is the population and FDP is the foreign direct investment, net flows percentage of GDP.  $\mu_t$  is a stationary error term. All the variables are taking logarithm.

The test of co-integration is performed in this paper using the autoregressive distributive lag model (ARDL) method developed by Pesaran et al (2001). The long-run relationship is estimated using a two-step method. The first step is to look for the presence of a long-run relationship predicted by theory between the variables in question. When the long-run relationship is calculated in the first step, the short and long-run parameters are estimated in the second step. According to Pesaran et al. (2001), an ARDL model representation of equation (2) is as follows:

$$lnpov_t = \alpha_0 + \sum_{i=0}^p \alpha_1 \Delta ln pov_{t-1} + \sum_{i=0}^q \alpha_2 \Delta ln pci_{t-1} + \sum_{i=0}^r \alpha_3 \Delta ln gdp_{t-1} + \sum_{i=0}^s \alpha_4 \Delta ln inf_{t-1} + \sum_{i=0}^t \alpha_5 \Delta ln fdi_{t-1} + \sum_{i=0}^u \alpha_6 \Delta ln pop_{t-1} + \beta_1 ln pci_{t-1} + \beta_2 ln pov_{t-1} + \beta_3 lngdp_{t-1} + \beta_4 ln inf_{t-1} + \beta_5 ln fdi_{t-1} + \beta_6 ln pop_{t-1} + \varepsilon_t \tag{2}$$

Where,  $\Delta$  is the first difference operator,  $\alpha_0$  represent the drift component, and  $\varepsilon_t$  represents the normal white noise residuals. The coefficients ( $\beta_1$ - $\beta_6$ ) represent the log-run relationship whereas the remaining expressions with summation sign ( $\alpha_1$ - $\alpha_6$ ) represent the short run dynamics of the model. For the short run dynamics of the

model, the unrestricted error correction model based on the assumption provided by Pesaran et al (2001) was also used. As a result, the error correction version of the ARDL model for equation (3) is as follows:

$$\Delta \ln pov_t = \alpha_0 + \sum_{i=0}^p \alpha_1 \Delta \ln cpi_{t-1} + \sum_{i=0}^q \alpha_2 \Delta \ln pov_{t-1} + \sum_{i=0}^s \alpha_3 \Delta \ln gdp_{t-1} + \sum_{i=0}^t \alpha_4 \Delta \ln inf_{t-1} + \sum_{i=0}^u \alpha_5 \Delta \ln fdi_{t-1} + \sum_{i=0}^v \alpha_6 \Delta \ln pop_{t-1} + YETC_{t-1} + \vartheta_t \quad (3)$$

Where, the speed of adjustment represents by  $Y$  which should be statistically significant with negative sign.  $\vartheta_t$  denotes a pure random error term. The short run dynamics of the model covering the equilibrium path are given by the coefficients of the lagged variables. The co-integration relation is implied by the error correction coefficient ( $Y$ ), which is assumed to be less than zero or one.

## 5. Empirical Results

Table 2 interprets the results of the Augmented Dickey-Fuller (ADF) unit root test and the Phillips-Perron unit root test with intercept and then both intercept and trend. Eviews 9 econometric software was used to build the ARDL model for empirical research. These results indicate that, four of the variables are I (1) and two of them is I (0). Such results of stationary test would not allow us to apply the Johansen approach of co-integration. This is one of the main justifications for using the ARDL approach developed by Pesaran,(2001).

**Table 2: Results of ADF Unit Root Tests**

Variables	level	1 <sup>st</sup> difference	Order of integration
Inpov	-3.896 (-3.021)	0.0014(-4.35)*	I(1)
Incpi	-2.192 (-3.021)	-5.551(-3.029)*	I(1)
Infdi	-3.964(-3.029)*	-4.016(-3.040)*	I(0)
Ingdp	0.697(-3.021)	-3.476(-3.029)*	I(1)
Ininf	-2.788(-3.021)*	-5.133(-3.029)*	I(0)
Inpop	-3.641(-3.021)	-6.464(-3.029)*	I(1)

Notes: \* denotes significance at the 5% level.

Co-integration was analyzed using the bound test. Table 3 displays the results of the bound test. The F-statistic is 6.781. This is higher than the 4.68 upper critical bound (1 percent significance level), indicating a long-term relationship between dependent and independent variables in 1996-2016 in Sri Lanka. This implies that there is reason to reject the null hypothesis that the variables have no long-term association. As a result, the alternative hypothesis is accepted: poverty, corruption, actual GDP, income equality, foreign direct investment, population, and inflation rate have a long-run equilibrium relationship.

**Table 3: Results of Bounds Test**

F-statistics	K	Significance Level	Bound Critical values	
			I(0)	I(1)
6.781	5	1%	3.41	4.68
		5%	2.62	3.79
		10%	2.26	3.23

Source: Author Calculation

**Table 4: Results of long run, short runs model and diagnostic tests**

Long run model coefficients		
Regressor	Coefficient	p-value
constant	-8.783	0.0113
lnpci	0.7263	0.001*
lnrdp	0.887	0.005*
lninf	-0.094	0.030**
lnpop	0.0117	0.627
lnfdi	-0.277	0.001*
Short run model coefficients		
Regressor	coefficient	p-value
Dlnpci	0.602	0.029**
Dlnrdp	-0.386	0.512
Dlninf	-0.038	0.1713
Dlnpop	0.016	0.633
DLnfdi	-0.277	0.0016*
Ecm	-0.237	0.016**
Diagnostic tests		(p-value)
Serial Correlation LM		0.5257
Normality Test		0.6664
ARCH Test		0.7406
Heteroscedasticity Test		0.6125
Ramsey RESET Test		0.1204

Notes: \* and \*\*denotes significance at the 1% and 5% level.

Source: Author Calculation

The ARDL (1, 0, 0, 0) model is selected using Akaike info criterion (AIC). The model was estimated the coefficients of long-run and short-run relationships. Table 4 shows the estimated long run relationship as well as the estimated short run coefficients. The short and long run effects of corruption on poverty levels were

calculated using the Error Correction Model (ECM) associated with equation (4). Furthermore, the Error Correction Term (ECM) coefficient is the speed of adjustment of poverty level to shocks in exogenous variables in the model. The ECM coefficient (-0.237) is negative and highly significant, implying that approximately 24% of every deviation from long-run equilibrium is corrected within one year.

According to the findings, corruption is important ( $P < 0.05$ ) and has a positive effect on the level of poverty in Sri Lanka. It means that a 1% increase in corruption, other things being equal, would result in a 0.7263 percent increase in poverty, although GDP is also important in the long run. It shows that a one percent rise in economic growth raises poverty by 0.887 percent. The positive relationship between poverty and economic growth in Sri Lanka, on the other hand, is cause for concern. This demonstrates that increases in economic activity gross income or outputs have not trickled down to the poorest of the poor. This means that greater portions of the economy's resources are in the hands of a few wealthy individuals known as capitalists.

In the long term, the FDI coefficient is -0.277 which is an important ( $p$  value is 0.24, which is greater than 5%). The coefficient of inflation rate is -0.094 and is significant ( $p$  values is 0.03 which is less than 5%). That is, a 1 percent increase in inflation rate decreases poverty by approximately 0.094 percent. The result suggests that the corruption has short run impact on poverty except GDP, inflation and population. In Table 4, diagnostic tests are performed on the model to determine serial correlation, normality (normality test), heteroscedasticity and white test, and Ramsey RESET Test. At the 5% significance level, the diagnostic test results indicate that there is no serial association, autoregressive conditional heteroscedasticity, or white heteroscedasticity. Standard residual terms are often revealed by the diagnostic test results. According to the Ramsey reset test, the model appears to be well defined.

### Stability Test of the Model

The Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) methods were used to assess the model's stability. Both plots in Figs. 1 and 2 are within the critical bounds at the 5% significance stage, indicating that the approximate model was stable during the research period.

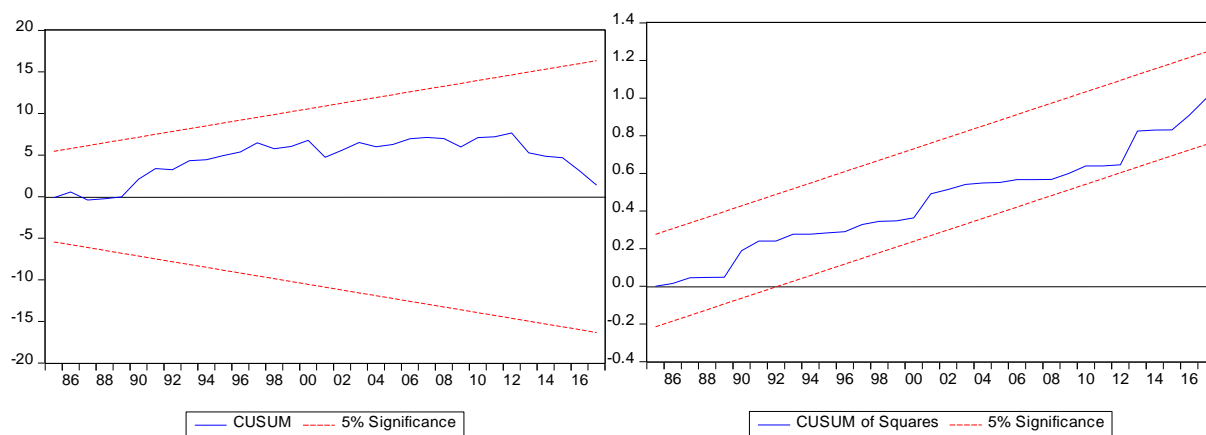


Figure 1: CUSUM Plots for Stability Tests Figure 2: CUSUMSQ Plots for Stability Test



In figures 1 and 2, the blue line lies between the upper and lower limits (the two red lines) in both Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ), indicating that the model used in the analysis is stable.

## 6.CONCLUSION

The main objective of this study to estimate the relation between poverty and corruption level in a country using 1996-2016 data, which are collected from World Bank, Transparency International and Central Bank report. The ARDL bounds testing approach with additional variables is used to investigate short run and long run relationships. The ARDL results reveals that a co-integration relationship among poverty, corruption, GDP, inflation rate and population. Corruption has a direct impact on poverty because corrupt practices deprive the poor of funds and services that could have been used to better their lives, such as poor health and education facilities, susceptibility to shocks, and other forms of poverty in Sri Lanka. This is consistent with the findings of Unver & Koyuncu (2016) and N'zue and N'Guessan (2005). The findings also support the view that a high level of corruption would exacerbate lower-income earners to pay a higher proportion of their income in bribes in order to access basic social services.

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