Sosyal Bilimler Araştırmaları Dergisi

Social Sciences Research Journal

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

IN THE LIGHT OF THE LOGIT MODEL: THE DARK RELATIONSHIP OF CORRUPTION AND POVERTY: THE CASE OF TURKEY[1]

Gülgün ÇİĞDEM[2]

Funda KARA[3]

Atilla AYDIN[4]

Süreyya İmre BIYIKLI[5]

ABSTRACT

Poverty, a complex issue present throughout history, and corruption, a global challenge, are critical topics that have long been the focus of academic and political discussions. Poverty encompasses not only material deprivation but also limited access to education, health, and social opportunities, impacting both individuals and society. Corruption, particularly harmful in developing countries, impedes economic growth and fosters social unrest, misuse of public resources, and injustice. This study investigates the relationship between poverty and corruption, using the Barro and Hanke Poverty Index to measure poverty in Turkey from 2014:01 to 2022:10. Findings reveal that as corruption increases, poverty rises, leading to a worsening economy. The results show that each unit increase in the Corruption Perception Index decreases the Logit value by 18.2 units. This study contributes to understanding the complex relationship between poverty and corruption, aiming to inform more effective strategies for improving social welfare.

Keywords: *Corruption, Poverty, Income Distribution, Logit.*

1. INTRODUCTION

Corruption, which includes different definitions, means "abuse of public power in line with individual interests". This phenomenon, which distorts public policies, leads to wrong resource allocation, harms the private sector, and harms poor individuals (Amundsen, 1999: 1), also undermines the accountability of political leaders by eroding trust in democratic institutions. Moreover, corruption

[1] Presented at 12th International İstanbul Scientific Research Congress on Humanities and Social Sciences.

[2] Assoc. Prof. Istanbul Gelişim University, gulguncigdem@gmail.com
[3] Asst. Prof. Istanbul Gelişim University, fukara@gelisim.edu.tr
[4] Ph.D. Istanbul Gelişim University, ataydin@gelisim.edu.tr
[5] Asst. Prof. Istanbul Gelişim University, simre@gelisim.edu.tr

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

activities allow organized crime groups to commit major crimes such as drug trafficking (European Union, 2014: 2). In terms of which types of crimes will be considered as corruption, whether or not political individuals are involved is decisive. For example; Transactions such as fraud, money laundering, black market, and drug trade turn into corruption crimes with the involvement of political actors (Jain, 2001: 73). Corruption; bureaucratic corruption (caused by bureaucracy), political corruption (caused by political leadership); cost reduction, benefit enhancement; bribery, central or local, with or without the use of money can occur with different practices in the form of corruption (Tanzi, 1998: 9). Corruption is seen in every part of the world, but according to Amundsen (1999), it is more prevalent in poor countries. The fact that dimensions of corruption are much higher in Sub-Saharan African countries and Latin American countries (Amundsen, 1999: 1).

One of the most important findings of the corruption literature is that higher economic welfare is closely related to lower corruption. In most studies, the findings indicate that corruption can disappear spontaneously with economic development. In other words, policies to be followed to promote economic growth will also contribute to reducing corruption (Uberti, 2022). Persson, Guido & Trebbi (2003) and Damania, Per & Muthukumara (2004) found in their studies that there is an inverse relation between corruption and income; accordingly, a decrease in income increases corruption. According to Paldam (2000), skewed income distribution makes illegitimate income attractive. Using the Gini coefficient, Paldam argues that the deterioration in income significantly increases corruption. The distribution of the benefits obtained from corruption among high-income groups, who generally have better communication with each other, affects the income distribution negatively (Tanzi, 1995: 171).

Corruption by encouraging higher investments in capital-intensive projects and lower investments in labor-intensive projects also increases poverty (United Nations Development Programme, 1997: 101). Such prejudices in investment strategies deprive poor people of earning income (Gupta, Davoodi, Alonso, 1998: 5).

Poverty is an issue that has become the focus of studies in recent years. The understanding that defines poverty only based on lack of income has now left its place in an approach that considers poverty as a multidimensional problem.

The literature mentions two approaches for analyzing the connection between corruption and poverty. The economic model comes first, followed by the governance model. According to the economic model; Increasing corruption first affects economic growth factors, reduces economic growth, increases injustice in income distribution, and increases poverty. According to the governance model; increasing corruption firstly affects governance factors, reduces governance capacity, and increases poverty (Chetwynd et al. 2003: 7-12).

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Countries' levels of poverty decline as corruption levels decline (as measured by a rise in the corruption perception index). There is research in the literature looking at how corruption and measuring of poverty are mutually causally related. Economic growth, inflation, and unemployment rates stand out more in the bulk of research examining the causes of corruption and poverty. It is possible to find several studies comparing nations, particularly those focusing on the connection between unemployment, inflation, and poverty. The majority of them contain data showing inflation and unemployment worsen poverty. Studies investigating the connections between corruption and inflation, unemployment, and growth- the variables that make up the Barro and Hanke Misery (Economic Discomfort) Index used in our study—have gained importance in recent years. According to studies, the degree of misery will tend to rise when unemployment, inflation, and interest rates rise and the growth rate declines. So, is there a connection between corruption and poverty in Turkey, where data on poverty have worsened and the ranking of corruption has shown a significant decline over the past ten years? The Corruption Perception Index and the Barro and Hanke Misery Index, which is an indicator used to evaluate poverty, were utilized in this study to see if there is a correlation between poverty and corruption in Turkey.

According to Transparency International Association 2021 Corruption Perception Index report; Turkey ranked 96th among 180 countries in the global ranking, lagging behind many countries where economic, social, and political instabilities are intense and which have not met democracy. Compared to the member states of the European Union, Turkey got a low score from 27 member countries, placing it in the last place after Bulgaria. Ranking 37th among 38 OECD countries, Turkey ranks third from the bottom among G20 countries (Transparency International Association, 2022).

The Corruption Perceptions Index, which Transparency International publishes, evaluates the level of corruption in a nation. Transparency International was founded in 1993, and its primary goal is to combat corruption. Each country receives a score of over 100 on the index; the lower the number, the more pervasive and effective the corruption there is (Lambsdoff, 2005: 2). The Corruption Perception Index is based on the findings of research carried out by at least three international institutes for each country and reflects the opinions of professionals, non-governmental organizations, and business representatives on corruption in the public sector.

The American economist Arthur Okun first suggested an index to measure poverty in 1970 that was the sum of the unemployment rate and the inflation rate. Later, American economist Robert Barro, a Nobel Prize winner, expanded this index in 1999 by using the interest and growth rates as well as inflation and unemployment rates. Barro and Hanke's Misery Index, on the other hand, has been an index preferred by researchers in terms of comparing macroeconomic performances.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Although studies are testing the relationship between poverty and corruption in literature, no study has been found using the Corruption Perception Index and the Barro and Hanke Misery Index. Therefore, this study is a literary contribution to the expansion of typology.

2. LITERATURE

There are surprisingly few studies in literature that specifically delve into the relationship between poverty and corruption. Ndikumana (2006) examined how corruption undermines economic growth and hinders efforts to alleviate poverty. The study concluded that corruption disproportionately harms the poor by stifling growth and reducing income.While the negative effects of corruption have been established with a large body of literature, only a limited number of studies have explored the intricate links between corruption, poverty, public debt, and economic growth (Jeng, 2018).

It is seen that in countries where corruption is low (Corruption Perceptions Index = CPI is high), the Human Development Index (HDI) level is also high and in countries where corruption is high (CPI is low), the Human Development Index is low. Both the literature and the reports of international organizations such as UNDP, FAO, WFP, and Transparency International reveal that corruption is common in backward societies, causes poverty, and that there is a direct and two-way relationship between corruption and corruption (Gültekin, 2015). The literature supports the idea that poverty is not caused by corruption on its own. Instead, corruption directly affects the governance and economic elements—mediators that in turn cause poverty. Consequently, the connection that searchers are looking at is indirect (Chetwynd et al. 2003).

Table 1: Highlight of the relationship of poverty and corruption related literature

Author(s)	Type of Analysis	Period	Variables	Conclusion
Chetwynd et al. (2003)	Literature review	-	Economic growth, corruption, poverty	The literature points to the conclusion that corruption, by itself, does not produce poverty. Rather, corruption has direct consequences on economic and governance factors, intermediaries that in turn produce poverty. Thus, the relationship examined by researchers is an indirect one. This paper discusses two major models explaining this moderated linkage between corruption and poverty: an economic model and a governance model.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

N'Zue and N'Guessan (2006)	Panel analysis for 18 African countries	1996-2001	Poverty, growth, corruption, growth, income inequality	Poverty causes growth, growth causes Corruption, no link between poverty and corruption, Corruption causes inequality poverty+growth cause corruption.
Dinçer and Günalp (2008)	Ordinary least squares (OLS technique)	1981-1997	The coefficient of variation (CV), Gini Index (Gini), standard deviation of the logarithms (SDL), and relative mean deviation (RMD)	Using data from U.S. states, the study examines how corruption affects incomeinequality and poverty. They discover compelling evidence that growing corruption worsens income inequality and poverty.
Negin et al. (2010)	Granger Causality and GMM for 97 developing countries	1997-2006	HPI, Corruption (CPI) inflation, Political Freedom and stability, rural population and gender	Corruption is positively and significantly impacted by poverty. Corruption in the public sector weakens institutions by preventing growth and escalating poverty. Poverty ↔ Corruption.
Ogboru and Abimiku (2010)	Regression with linear equation model	1981-2009	Employment rate, gross domestic product, debt stock, capital expenditure, government expenditure on infrastructure and type of rule.	This paper has attempted to evaluate the impact of corruption on the nation's poverty situation. The paper has been able to establish that corruption has negatively affected the operations of poverty reduction efforts in the country.
Rayahu and Widodo (2012)	Two steps GMM for 9 ASEAN countries	2005-2009	Poverty (HDI), Corruption (CPI) Inflation Gender	Although poverty doesnt affect corruption, corruption causes poverty.
Justesen and Bjørnskov (2014)	Multilevel regression analysis for 18 African countries	2005-2006	Survey from Afrobarameter; bribe index, index of lived poverty	Poverty at a high level invites corruption at a high degree.
Yusuf et al. (2014)	VECM with co-integration test	1970-2011	Corruption, poverty economic growth	The results indicate a long-run relationship between corruption, economics, and poverty in Nigeria. Evidence from the dynamic economic growth model has a linkage of growth influence on corruption. Therefore, our findings strongly supported a reduction in corruption through the institutional good governance approach.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Gültekin (2015)	Based on literature and the reports of international organizations	2012	Corruption Perception Index (CPI) and Human Development Index (HDI)	According to HDI (the Human Development Index) and CPI (the Corruption Perception Index), there is a considerable link between development, corruption, and ethical management. Human development is generally higher in nations with linferior grades of corruption, and vice versa.
Ünver and Koyuncu (2016)	Panel analysis for 154 countries	2000-2013	Dependent variable Corruption Independent variable: Poverty, FDI, trade opennes, inflation rate, democracy level	While trade openness, the level of democracy, and FDI, have statistically significant negative impacts on corruption, all poverty variables and inflation rates have statistically significant positive benefits.
Cabral (2017)	The dynamic computable general equilibrium model (CGE)	2005-2012	Poverty, corruption, economic growth	This study makes an effort to evaluate how corruption affects Senegal's economy, wellbeing, and level of poverty. The simulation demonstrated that growth slows, wellfare deteriorates, and the prevalence of poverty rises when corruption accounts for a 10% leakage of public investment.
Karluk and Ünal (2017)	Correlation coefficient	2000-2012	Corruption perception index, gini coefficient	The results show that there is a negative relationship between the Gini coefficient and the corruption perception index for the countries in our dataset, except Argentina and Colombia. It is noteworthy that the aforementioned negative relationship is strongest in Turkey among the countries included in this study.
Jeng (2018)	The multiple regression analysis	1992-2016	Corruption, Income Inequality (Poverty), Economic Growth, and Public Debt	In Gambia, this research examines the connections between poverty, corruption, state debt, and growth. Results show that in Gambia, poverty, and corruption have a statistically significant and positive association.
Omoniyi (2018)	Error correction model, the cumulative and cyclical theory , and	1980-2013	Poverty, economic growth	The impact of poverty on Nigeria's economic growth was analyzed in this article. Negative correlations between economic growth and poverty, corruption, debt, mortality,

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

	the Solow–Swan growth methodology			human capital development, and unemployment were observed. In Nigeria, corruption and other factors do not determine poverty.
Gupta et al. (2022)	Ordinary least squares (OLS technique)	1980-1997	Corruption, income inequality and poverty, gini coefficient	Poverty and income disparity are exacerbated by widespread and escalating corruption. With a one standard deviation increase in corruption, the Gini coefficient of income disparity grows by around 11 points, while the income growth of the poor is raised by about 5 percentage points annually.
Silva et al. (2022)	The approach used by Dumitrescu and Hurlin (2012) for panels with heterogeneous data.	2002-2018	Control of Corruption Index (CC), the Corruption Perception Index (CPI), and the indexes established by Foster, Greer, and Thorbecke as measurements of poverty (1984)	The causal relationship between poverty and corruption in Brazil and a group of South American nations is examined in this study. The P2 indicator of extreme poverty and the findings indicate that CC causation is one-directional for all metrics of poverty.
Gengörü (2024)	Document analysis technique	-	Economic growth, public debt, poverty, corruption	As a result of the research, it was revealed that corruption affects economic growth, increases public debt and, as a result, has an impact on poverty.

In the literature, studies emphasizing the causal relationship between poverty and corruption in general are predominant. The view that an increase in corruption will also increase poverty is also widespread.

While the number of research examining the impact of the concepts of poverty and corruption on other variables separately is high, it is an undeniable fact that our study, which directly deals with the relationship between these two in-depth, will significantly contribute to the field of literature.

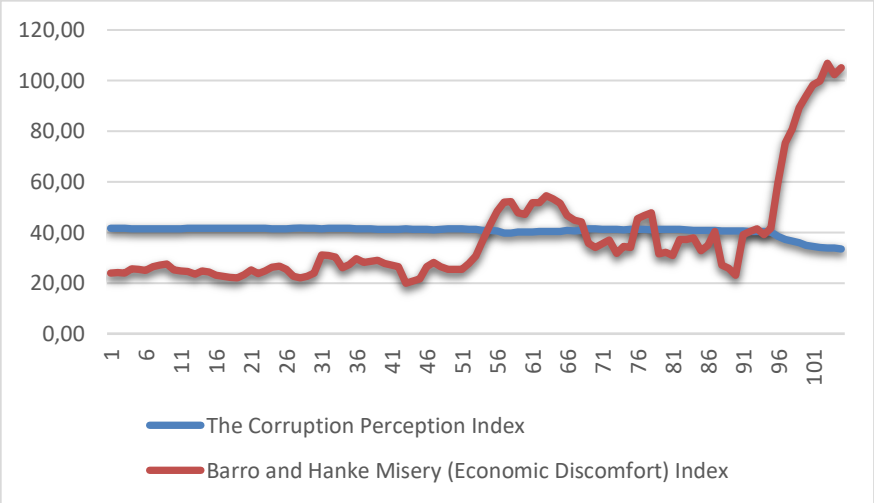
3. METHODOLOGY

The Corruption Perception Index for Turkey and the Barro and Hanke Misery Index were used as data sets in this study. Transparency International provided data on the corruption perception index. The Barro and Hanke Misery Index was calculated within the framework of this study. The data range covers January 2014 to October 2022. The Corruption Perception Index was converted from annual data to monthly data for this study by associating it with inflation rates. Okun was the first to develop the misery index (1970). The said index is calculated by summing the inflation and unemployment rates. Later,

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Barro (1999) developed this index and added the deviations of long-term interest rates and GDP from the long-term average to the index. Then, Hanke (2009) developed the previous indexes and obtained a new misery index by subtracting the per capita GDP rate from the sum of unemployment, inflation, and bank loan interest rates. In this study, the index developed by Hanke (2009) was calculated for the Turkish economy and used as the data for the misery index. Figure 1 shows the course of the Barro and Hanke Misery Index and The Corruption Perception Index over time. The deterioration in The Corruption Perception Index and the deterioration in the Barro and Hanke Misery Index are noteworthy.

Figure:1 Barro and Hanke Misery Index and The Corruption Perception Index (Turkey)



Source: Created by authors.

The misery index series used in the study is considered as a two-choice qualitative variable that takes 1 and 0 values according to its monthly increase and decrease. The variable in question is defined as follows.

$$Dependent\ Variable = \begin{bmatrix} 1, & If\ the\ misery\ index\ increased\ compared\ to\ the\ previous\ month \\ 0, & If\ the\ misery\ index\ decreased\ compared\ to\ the\ previous\ month \end{bmatrix}$$

The poverty perception index, which is included as an independent variable in the model, is a quantitative variable. In this study, the Logit model which is among the models with qualitative dependent variables, was used. Qualitative dependent variable models can also be considered as linear probability models and estimated using the least squares method. However, in the linear probability model, the probability of preference increases linearly with the independent variable (Stock and Watson, 2012: 434). In this case, increases in the independent variable cause a constant impact on the dependent

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

variable. In other words, the probability of preference can fall outside the (0,1) range (Gujarati and Porter, 2018, p.545). Logit model is used to eliminate the drawbacks of linear probability model. The probability distribution function of the logit model is defined as follows (Hill et al., 2011: 595).

$$P_i = \frac{1}{1+e^{-Z_i}} = \frac{e^Z}{1+e^Z} \quad (1)$$

From the above equation, the following expression can be obtained.

$$1 - P_i = \frac{1}{1+e^{Z_i}} \quad (2)$$

When the equation (1) above is proportioned to the equation (2), the following expression is obtained.

$$\frac{P_i}{1-P_i} = e^{Z_i} \quad (3)$$

The tie number (3) above is called the odds ratio. The following expression is obtained when the native logarithm of both sides of this equation, which expresses the odds ratio, is taken.

$$L = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i \quad (4)$$

If Zi=β1+β2 Xi is expressed as, the logarithm of the odds ratio becomes linear with respect to the population parameters. L, which represents the logarithm of the odds ratio, is defined as Logit. Contrary to the Logit value, which is linear according to both X and β1 and β2, preference probabilities are not in a linear relationship with Xİ (Çil, 2018: 177).

The most similarity method is used in the estimation of the logit function (Gujarati and Porter, 2018, pp.555-566). Following is a definition of the similarity function.

$$L(y\backslash x) = P(y\backslash x) = \sum_{i=1}^{n} p_i^{y_i}(1-p_i)^{1-y_i} \quad (5)$$

Within the framework of the most similarity method, it is aimed to calculate the β parameters that will maximize the function in the equation (5). In this context, the following equation is obtained by taking the logarithm of the similarity function.

$$L(y\backslash x, \beta) = \sum_{i=1}^{n}[y_i log p_i + (1-y_i)\log(1-p_i)] \quad (6)$$

After this process, the parameters that will maximize the function are estimated by taking the first-order derivative of the function (Stock and Watson, 2012: 438).

Z statistics are used to examine the significance of the estimated parameters in the Logit model. Since the z statistic is used instead of the t statistic, the normal distribution critical values table is used. To examine the significance of the whole model, the likelihood ratio statistic, which is expressed as LR statistic, is used instead of the F statistic used in linear regression models. The main hypothesis of the said significance test is that all parameters are zero at the same time. While the basic hypothesis is correct, the Chi-Square distribution is fit by the LR statistic with the same grades of freedom as

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

independent variables. The value of R2 as a measure of goodness of fit is non-functional in two-choice dependent variable models. Instead, the McFadden R2 value is calculated. Another measure of goodness of fit, which is easier to calculate, is defined as the counting R2 and is measured as follows (Gujarati and Porter, 2018: 563).

$$R^2 = \frac{Number\ of\ correct\ guesses}{Number\ of\ observations} \quad (7)$$

To calculate the number of correct predictions in the above equation, probability values are calculated one by one and probability values less than 0.5 are evaluated as 0, and probabilities greater than 0.5 are evaluated as 1. Then, the number of correct predictions is found by equating the predicted values with the observed values.

Within the framework of the above explanations, the Logit model used for this study is as follows.

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_1 + \beta_2 Corruption\ Perceptions\ Index_i + u_t \quad (8)$$

It is important that the series are stationary in the analyzes where the time series is used. Working with non-stationary time series can lead to spurious regression issues, as Granger and Newbold (1974) demonstrated. In this context, unit root tests were used to investigate the stationarity of the poverty perception index used in the study. The Augmented Dickey-Fuller test, which was first improved by Dickey and Fuller (1979) and later expanded by Dickey and Fuller, was used to investigate the stationarity. In this unit root test, three different model specifications are used.

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=2}^{p} \delta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (9)$$

$$\Delta Y_t = \mu + \delta Y_{t-1} + \sum_{i=2}^{p} \delta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (10)$$

$$\Delta Y_t = \mu + \beta t + \delta Y_{t-1} + \sum_{i=2}^{p} \delta_i \Delta Y_{t-i+1} + \varepsilon_t \quad (11)$$

The equation numbered (9) above is defined as the model without a constant, the equation numbered (10) is described as the fixed model, and the regression equation (11) is defined as the model with constant and trend. To solve the autocorrelation issue, the lagged values of the dependent variable were included in the model. The following is an expression of the test's primary and alternate hypotheses.

$$H_0: \delta = 0 \quad (12)$$

$$H_1: \delta < 0 \quad (13)$$

The test statistic calculated for the hypothesis test should be compared with the critical values. If the calculated test statistic is greater than the critical value at the relevant significance level, the basic hypothesis cannot be rejected. So it is determined that the series is not stationary.

In Dickey-Fuller unit root tests, the error terms are assumed to be non-autocorrelated and with constant variance. Dickey and Fuller (1981) added lagged values of the dependent variable to the model to eliminate the autocorrelation problem. Phillips and Perron (1988) developed Dickey-Fuller tests and

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

introduced a new non-parametric unit root test. In the Phillips-Perron unit root test process, although the expected value of the error terms is zero, there is no need to assume that they are not autocorrelated and have constant variance (Enders, 2010: 229). The following test statistic is used within the framework of the Phillips-Perron unit root test.

$$Z_\alpha = T\left(\widehat{\emptyset_1} - 1\right) - CF \quad (14)$$

In the above expression, CF is defined as the correction factor. The basic and alternative hypotheses regarding the Phillips-Perron unit root test are the same as those used in the Dickey-Fuller test. The same critical values can be used in the decision phase.

An important situation encountered in time series analysis is known as structural break. Traditional unit root tests assume that shocks in the series are temporary. Nelson and Plosser (1982) showed that shocks can be permanent. Perron (1989) revealed that if there is a structural break in the series and the said break is not included in the unit root test, the test will tend to accept the unit root hypothesis. In this framework, many unit root tests have been developed that take into account structural breaks or breaks. After the structural break unit root test, which was first developed by Perron (1989), tests such as Zivot-Andrews (1992), Lumsdaine-Papell (1997), Perron (1997), Lee-Strazicich (2003, 2004) are some of the commonly used tests in the literature. In this study, unit root test developed by Narayan and Poop (2010) and considering two structural breaks was used as a unit root test with structural break. The advantage of the Narayan-Poop unit root test over the previously developed tests is to maximize the importance of dummy variables representing break dates. In this context, the breaking dates can be determined more precisely. The following two models are used within the framework of the Narayan-Poop unit root test.

$$Y_t^{M1} = \rho Y_{t-1} + \alpha_1 + \beta^* t + \theta_1 D(TB')_{1,t} + \theta_2 D(TB')_{2,t} + \delta_1 (DU')_{1,t-1} + \delta_2 (DU')_{2,t-1} + \sum_{j=!}^{k} \beta_j \Delta y_{t-j} + e_t \quad (15)$$

$$Y_t^{M2} = \rho Y_{t-1} + \alpha^* + \beta^* t + K_1 D(TB)'_{1,t} + K_2 D(TB)'_{2,t} + \delta_1^* (DU')_{1,t-1} + \delta_2^* (DU')_{2,t-1} + \gamma_1^* (DT)'_{1,t-1} + \gamma_2^* (DT)'_{2,t-1} + \sum_{j=1}^{k} \beta_j \Delta Y_{t-j} + e_t \quad (16)$$

The TB' in the above equations shows the break dates. The θi and γi parameters in the models explain the breaks in level and trend, respectively. The first model considers two breaks at the level, while the second model considers two breaks at the level and the slope. The main and counter hypotheses of the Narayan-Poop unit root test are expressed as follows.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

$H_0: \rho = 1$ (17)

$H_1: \rho < 1$ (18)

The t statistic is used to test the unit root. The critical values used in the decision process can be obtained from the study of Narayan and Poop (2010). If the calculated test statistic is greater than the critical value at the relevant significance level, the basic hypothesis that the series is unit rooted with two breaks cannot be rejected. Otherwise, the series is concluded to be stationary under two structural breaks.

Another unit root test used in this study is the Lee-Strazicich (2003) unit root test, which takes into account two structural breaks. The basis of the Lee-Strazich unit root test is the Lagrange multiplier improved by Schmidt and Phillips (1992). Perron (1989) models were used in the testing process. Model C, which allows two breaks in level and slope, was used in this study. The null hypothesis and alternative hypothesis for the model in question are as follows.

$Y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + y_{t-1} + \varepsilon_{1t}$ (19)

$Y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + \omega_1 DT_{1t} + \omega_2 DT_{2t} + \varepsilon_{2t}$ (20)

The test statistics used in the unit root test are calculated using the following regression equation.

$\Delta Y_t = \delta' \Delta Z_t + \emptyset \tilde{S}_{t-1} + \sum \gamma_i \Delta \tilde{S}_{t-i} + u_t$ (21)

The main and alternative hypotheses of the Lee-Strazich unit root test are expressed as follows.

$H_0: \emptyset = 0$ (22)

$H_1: \emptyset < 0$ (23)

If the calculated test statistic is greater than the critical value at the selected significance level, the null hypothesis suggesting that the series has a unit root with two structural breaks cannot be rejected. In other words, it is concluded that the series is not stationary under two structural breaks.

4. FINDINGS

First of all, unit root tests were applied for the corruption index series. Expanded Dickey-Fuller Test results are summarized in Table 2. Due to the nature of the data, the unfixed model was not considered, and the test was carried out within the framework of Model B and Model C specifications.

Table 2: ADF Unit Root Test Results with Level Values

	Model B	**Model C**
Test Statistic	-0,124036	-1,117642
%1 Critical Value	-3,495677	-4,050509
%5 Critical Value	-2,890037	-3,454471
%10 Critical Value	-2,582041	-3,152909

As seen in Table 2, the test statistics calculated for both models are greater than the critical values.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

In this context, the basic hypothesis suggesting that the corruption perception index series is unit rooted cannot be rejected. In this context, it is understood that the series does not follow a stationary process. Two models were also used for the Phillips-Perron unit root test, and the test results are presented in Table 3.

Table 3: PP Unit Root Test Results with Level Values

	Model B	Model C
Test Statistic	2,333916	0,857107
%1 Critical Value	-3,493747	-4,047795
%5 Critical Value	-2,889200	-3,453179
%10 Critical Value	-2,581596	-3,152153

When Table 3 is examined, it is seen that the test statistics calculated for both models are larger than the critical values. In this case, the basic hypothesis suggesting that the corruption perception index series is unit rooted cannot be rejected. In other words, the series is not stationary according to the Phillips-Perron unit root test. In the next stage, the analysis continued with the Narayan-Poop unit root test, which takes into account two structural breaks. Test results are presented in Table 4.

Table 4: Narayan-Poop Unit Root Test Results with Level Values

	M1	M2
Test Statistic	-1,143	-1,962
%1 Critical Value	-4,958	-5,576
%5 Critical Value	-4,316	-4,937
%10 Critical Value	-3,980	-4,596
Break Dates	57, 66	56, 68

As seen in Table 4, the test statistics calculated in both models are larger than the critical values for all three significance levels. In this case, the basic hypothesis that the series is unit rooted with two structural breaks cannot be rejected. In other words, the corruption perception index series was not found to be stationary under two structural breaks. In order to start the logit analysis, it is important to what extent the series become stationary. In this framework, unit root tests were repeated by taking the first difference of the corruption perception index series. The Augmented Dickey-Fuller unit root test results for the first-difference series are summarized in Table 5.

Table 5: ADF Unit Root Test Results with First Difference Values

	Model B	Model C
Test Statistic	-2,952959	-5,302080
%1 Critical Value	-3,495677	-4,048682
%5 Critical Value	-2,890037	-3,453601
%10 Critical Value	-2,582041	-3,152400

As seen in Table 5, the test statistics calculated when the first difference of the corruption perception index series is taken; It is greater than the critical values at 5% and 10% significance levels

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

for Model B, and at three significance levels for Model C. In this case, it can be said that the series becomes stationary when the first difference is taken. The same process was performed for the Phillips-Perron unit root test and the results are presented in Table 6.

Table 6: PP Unit Root Test Results with First Difference Values

	Model B	**Model C**
Test Statistic	2,952939	-5,302080
%1 Critical Value	-3,495677	-4,048682
%5 Critical Value	-2,890037	-3,435601
%10 Critical Value	-2,582041	-3,152400

According to Table 6, the test statistics calculated when the first difference of the corruption perception index series is taken; It is greater than the critical values at 5% and 10% significance levels for Model B, and at three significance levels for Model C. When the first difference is taken, the series in this instance can be said to become stationary. At this point, it is seen that both tests applied give the same result. The results of the Narayan-Poop unit root test are summarized in Table 7.

Table 7: Narayan-Poop Unit Root Test Results with First Difference Values

	M1	**M2**
Test Statistic	-3,472	-6,449
%1 Critical Value	-4,958	-5,576
%5 Critical Value	-4,316	-4,937
%10 Critical Value	-3,980	-4,596
Break Dates	56, 65	55, 67

As seen in Table 7, the test statistic calculated in the M1 model, which deals with two breaks at the level, is larger than the critical values, and small in the M2 model, which considers two breaks at the level and slope. In other words, the first difference of the series with respect to the M1 model is that while it is a unit root, it is stationary compared to the M2 model. In this context, it can be said that the Narayan-Poop unit root test gives similar results with traditional unit root tests. Finally, the stationarity of the series was investigated with the Lee-Strazich unit root test, which takes into account two structural breaks, and the test results are summarized in Table 8.

Table 8: Lee-Strazicich Unit Root Test Results with First Difference Values

Test Statistic	-9,2886
%1 Critical Value	-6,32
%5 Critical Value	-5,73
%10 Critical Value	-5,32
Break Dates	57, 93

As seen in Table 8, the test statistic calculated at three significance levels is smaller than the critical values. In this case, the basic hypothesis that the series is unit rooted under two structural breaks is rejected. In other words, it was concluded that the difference series for the corruption perception index

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

was stationary with two structural breaks. In line with this result, the Logit model was established with the first difference series of the corruption perception index. The model can be expressed in the form given below.

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_1 + \beta_2 d(Corruption\ Perceptions\ Index_i) + u_t \quad (24)$$

The above model was estimated with the most similarity method and Table 9 displays the estimation findings.

Table 9: Logit Model Results

	Coefficient	Standard Error	Z Statistic	Probability
Corruption	-18,28962	3,987527	-4,586708	0,0000
Constant	-0,376591	0,273782	-1,375513	0,1690
McFadden R^2	0,359839	-	-	-
LR	52,10054	-	-	0,0000

From Table 9, it is seen that the estimated coefficient regarding the corruption perception index is statistically significant. The sign of the predicted coefficient is consistent with the expectation. As the corruption perception index decreases, the misery index tends to increase. The LR statistic, which tests the significance of the model, was also found to be statistically significant. The McFadden R2 value is 36%. Although this value is sufficient, it is not very important for qualitative dependent variables. The coefficient interpretation in logit models differs from linear regression models. Considering that the model numbered (24) is linear, it can be said that a one-unit increase in the corruption perception index reduces the Logit value by 18.2 units. However, this inference does not provide information on how likely it is to reduce discontent. Probability values need to be calculated separately. It is possible to calculate probability values using equation (1). For example, the probability of increasing discontent for January 2015 can be calculated using equation (1) as follows.

$$P_i = \frac{1}{1+e^{-(\beta_1+\beta_2 Endeks)}} = \frac{1}{1+3,90328} = 0,203945 \quad (25)$$

As can be seen from the calculations, the probability of increasing misery index for January 2015 was found to be approximately 20%. As a matter of fact, while the misery index for December 2014 was 25.56, the index for January 2015 was 25.44. So the misery index has dropped. The probability of misery for the period in question is naturally 80%. In this context, it can be said that the model's estimation for January 2015 is correct. The Logit model has assigned a value of zero for the period in question. The calculated probability is not zero. However, since it is less than 0.5, it can be said to be close to zero. Probability values and accuracy of estimates for some periods are summarized in Table 10.

Sosyal Bilimler Araştırmaları Dergisi
Social Sciences Research Journal
DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Table 10: Probability Estimates of the Barro-Hanke Misery Index for Selected Periods

Period	Assigned Probablity	Estimated Probablity	Result
2015 December	1	0,76	True
2016 November	1	0,93	True
2017 March	1	0,68	True
2017 September	1	0,73	True
2018 January	0	0,36	True
2018 July	1	0,97	True
2019 March	1	0,31	Wrong
2020 April	1	0,62	True
2021 August	1	0,56	True
2022 June	1	0,83	True
2022 September	1	0,98	True

In Table 10, the probability of increasing the misery index for some periods is given. Although the logit values vary linearly according to the poverty perception index, the probability values are not in a linear relationship with the independent variable. For this reason, the marginal change probabilities in the misery index against the changes in the poverty perception index should be calculated one by one. If the predicted probability is greater than 0.5 and the assigned probability value is 1, it is understood that the prediction is correct. The prediction is likewise considered correct if the probability value is less than 0.5 and the assigned probability is 0. For example, the probability of an increase in the misery index for January 2018 was estimated as 0.36. Since the assigned probability is 0, it is revealed that the probability estimation made is correct. Although the probability estimate value for March 2019 is 0.31, the assigned probability value is 1. In this case, it is understood that the estimation is wrong. With this method, all prediction probabilities were made and the results for 104 predictions were compared with the assigned probabilities. One observation was lost because the difference was taken, and the observation value decreased to 104. It was seen that 29 of 104 predictions were wrong and 75 were correct. In this context, the counting R2 can be calculated as follows.

$$Counting\ R^2 = \frac{75}{104} = 0{,}72 \quad (26)$$

The McFadden R2 was 36%, while the counting R2 was 72% (Equation 26). When these two values are evaluated together, it can be said that the explanatory power of the model is high.

5. CONCLUSION

The purpose of this research is to examine the existence of a relation between corruption, which is seen all over the world, but mostly in poor countries, and poverty, which is a multidimensional phenomenon. To achieve this, the Barro and Hanke Misery Index was calculated by taking the unemployment, inflation, growth, and 10-year bond interest data for the period 2014:01-2022:10 by

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

considering Turkey, which has shown a great decline in the corruption perception index in the last 10 years and worsening in the poverty data. Corruption Perception Index was also obtained from Transparency International and associated with inflation rates and converted from annual data to monthly data for this study. Augmented Dickey-Fuller test, Phillips-Perron unit root test, Narayan and Popp (2010), and Lee-Strazicich (2003) unit root tests with two structural breaks were used to determine the stationarity of the series. Since the dependent variable the Barro and Hanke Misery Index is a qualitative variable, the Logit model, which is among the models with qualitative dependent variables, was used in the analysis. According to the analysis results;

-As the corruption perception index decreases, the Barro and Hanke Misery Index tends to increase. In other words, the increase in corruption causes an increase in poverty and a deterioration of the economy in Turkey.

- A one-unit increase in the Corruption Perceptions Index reduces the Logit value by 18.2 units.

Corruption leads to inefficient utilization of financial resources, undermines the sense of justice, equality, and trust in society, and hinders the achievement of long-term development goals. The limited number of studies in this field in the literature increases the importance of this research. Eradicating corruption is a complex and multidimensional process that cannot be achieved through economic measures alone. At this point, political reforms and strict bureaucratic regulations should come into play and all segments of the society should adopt these mechanisms. In particular, building a governance structure based on the principles of transparency, accountability and the rule of law is vital to eradicating corruption. Corruption is a deep-rooted and complex issue, one that cannot be solved through economic measures alone. For efforts to truly take hold and be embraced across all levels of society, political reforms must be introduced, alongside tighter regulations in the bureaucracy. Eliminating corruption requires more than just policy. It calls for a governance model that embodies accountability, transparency, and respect for the rule of law — values that build trust and ensure lasting change.

i. Political Reforms: Changing the political system from the ground up is the most crucial stage in the battle against corruption. Ensuring trust in all spheres of society requires the political institution to be resilient against corruption. Regarding this, the following reforms are suggested:

Increasing Accountability and Transparency: To guarantee open supervision of public servants' and politicians' financial conduct, independent bodies must to be set up. In addition to preventing corruption, the values of accountability and openness also help to restore public confidence.

Election Reforms and the Autonomous Judiciary: Election procedures should require the transparent filing of candidates' financial records.As a vital component in the battle against corruption, the independent judiciary ought to be a major player in guaranteeing accountability.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

ii. Bureaucratic Reforms:

In addition to political reforms, fundamental changes in the bureaucratic structure of the state are also essential. Stringent bureaucratic arrangements can minimise the risk of corruption by ensuring more efficient use of public resources. In this context, the following steps should be taken:

Transparency in Public Procurement Processes: Public tenders, one of the most common areas of corruption, should be restructured with transparency and audit mechanisms. Digital platforms should be established for all public tenders and these platforms should enable transparent monitoring of tenders.

Independent Audit and Control Mechanisms: Independent audit boards play a key role in the effective fight against corruption. Regular auditing processes on the management of public resources accelerate the detection of malpractices and increase the deterrent effect of these processes.

iii. Education and Awareness Programs: A comprehensive approach to combating corruption should incorporate long-term public awareness campaigns and education. A conscious resistance to corruption is developed in all spheres of society when ethical ideals are strengthened in individuals via education. Future generations will be more resilient to corruption if they are specifically taught about the negative social and economic effects of it.

iv. International cooperation: Corruption is a global concern in addition to a domestic one. Thus, to guarantee worldwide coordination against corruption, it is critical to fortify international cooperation. Joint projects and strategies should be established in this regard, as well as an increase in the role of international agreements and organizations in the fight against corruption. Eliminating corruption means overcoming one of the biggest obstacles to economic and social development. To move forward, political reforms and robust bureaucratic regulations that are essential for enhancing social welfare and achieving sustainable development goals are needed. While to understand the social implications of corruption, it's equally important to dive deep into its economic impacts and contribute more to the existing literature in this area. This study serves as a valuable resource for future research and for policymakers by offering actionable recommendations in the fight against corruption. Preventing corruption is not just an economic necessity; it is a humanitarian obligation. Every effort made toward creating a fair and transparent society brings humanity closer to a future filled with hope.

REFERENCES

Amundsen, I. (1999). Political Corruption: An Introduction to the Issues. http://www.cmi.no/publications/file/1040-political-corruption.pdf.

Barro, R. J. (1999). Reagan vs. Clinton: Who's The Economic Champ? Business Week. Economic Viewpoint, 22.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Cabral, F. J. (2017). "Risk of Corruption For Economic Growth and Poverty: The Case of A Developing Country". Risk Governance & Control: Financial Markets & Institutions. 7(2): 129-139.

Chetwynd, E., Chetwynd, F. & Spector, B. (2003). Corruption and Poverty: A Review of Recent Literature. Washington, Water Street SW. 1-21.

Çil, N. (2018), Finansal Ekonometri, İstanbul: Der Yayınları.

Damania, R., Per, F. & Muthukumara, M. (2004). The Persistence of Corruption and Regulatory Compliance Failures: Theory. http://www.imf.org/external/pubs/f t/wp/2003/wp03172.pdf

Dickey, D. A. & Fuller, W. A. (1979). Distribution of The Estimators For Autoregressive Time Series With A Unit Root. Journal of the American Statistical Association, 74(366): 427-431.

Dickey D.A. & Fuller W.A. (1981). "Likelihood Ratio Statistics for Autoregressive Time Series with A Unit Root". Econometrica, 49(4): 1057 1072.

Dinçer, O. C. & Günalp, B. (2008). Corruption Income Inequality and Poverty In The United States. KTHC – Knowledge, Technology, Human Capital. 1-36.

Enders, W. (2010). Applied Econometric Time Series. Third Edition, New York: Wiley.

European Union (2014). Special Baromet 397 Corruption. http://ec.europa.eu/public _opinion /archives/ebs/ebs_397_en.pdf

Gengörü, F. (2024). Yoksulluk ve Yolsuzluk İlişkisi Üzerine Bir İnceleme. Yönetim ve Eğitim Bilimleri Dergisi, 3(1): 11-29.

Gujarati, D.N. & Porter, D.C. (2018). Temel Ekonometri. Çevirenler: Şenesen, Ü., Göktürk Şenesen, G., İstanbul: Literatür Yayıncılık.

Gupta, S., Davoodi. H. & Terme, R. (1998). Does Corruption Affect Income Inequality and Poverty?. http://www.imf.org /external/pubs/ ft/wp/wp9876.pdf.

Gupta, S., Davoodi, H. & Alonso-Terme, R. (2002). Does Corruption Affect Income Inequality And Poverty?. Economics of Governance, 3: 23-45.

Gültekin, S. (2015). "Etik Yönetim Yolsuzluk ve Yoksulluk İlişkisi Üzerine Bir İnceleme". International Journal of Economic and Administrative Studies. 7(14): 400-422.

Hanke, S. H. (2009). The Misery Index: A Reality Check For The US And Jamaica. Jamaica Observer, September, 6.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

Hill, R.C., Griffiths, W.E. & Lim, G.C. (2011). Principles of Econometrics. John Wiley and Sons, 4th Edition.

Jain, K. (2001). "Corruption: A Review. Journal of Economic Surveys, 15(1): 71-121.

Jeng, A. M. (2018). Studying The Relationship Between Corruption and Poverty Public Debt and Economic Growth: A Case Study Of The Gambia (1996-2016) (Master of Science Thesis).

Justesen, M. K. & Bjørnskov, C. (2014). "Exploiting The Poor: Bureaucratic Corruption and Poverty In Africa". World Development, 58: 106-115.

Karluk, R.S. & Ünal, U. (2017). Türkiye Ekonomisinde Yoksulluk Yolsuzluk ve Gelir Dağılımı İlişkisi. MPRA Paper, No.70118. 1-21.

Lee, J. & Strazicich, M.C. (2003). "Minimum Lagrange Multiplier Unit Root Test With Two Structural Breaks". The Review of Economics and Statistics, 85(4): 1082-1089.

Lambsdorff, Johann G. (2005). "The Methodology of The 2005 Corruption Perceptions Index". Transparency International and University of Passau, mimeo. 1-13.

Lumsdaine, R. L. & Papell, D. H. (1997). "Multiple Trend Breaks And The Unit Root Hypothesis". The Review of Economics and Statistics, 79: 212-218.

Narayan, P.K. & Popp, S. (2010). "A New Unit Root Test With Two Structural Breaks In Level And Slope At Unknown Time". Journal of Applied Statistics, 37(9): 1425-1438.

Ndikumana, L. (2006). "Corruption And Pro-Poor Growth Outcomes: Evidence And Lessons For African Countries. Politicial Economy Research Institute, Workingpaper Series, 120: 1-39.

Negin, V., Abd, R., Zakariah, B. & Nikopour, H. (2010). "The Causal Relationship Between Corruption and Poverty: A Panel Data Analysis". MPRA Paper, 24871: 1-13.

Nelson, C. & Plosser, C. (1982). "Trends And Random Walks In Macroeconomic Time Series: Some Evidence And Implications". Journal of Monetary Economics, 10: 139-169.

N'Zue, F. F. & N'Guessan, C. J. F. (2006). The Causality Between Corruption Poverty And Growth: A Panel Data Analysis. Secretariat for Institutional Support for Economic Research in Africa SISERA, Workingpaper Series.

Okun, A.M. (1970). The political economy of prosperity. The Brookings Institution.

Perron, P. (1989). "The Great Crash The Oil Price Shock And The Unit Root Hypothesis". Econometrica, 57: 1361-1401.

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101
Ogboru, I., & Abimiku, A. C. (2010). The Impact of Corruption on Poverty Reduction Efforts In Nigeria. Department of Economics University of Jos. 1-28.

Omoniyi, B. B. (2018). "An Examination of the Causes of Poverty on Economic Growth In Nigeria". Africa's Public Service Delivery and Performance Review, 1-10.

Paldam, M. (2000). The Cross-Country Pattern of Corruption: Economics Culture and the Seasaw Dynamics. martin.paldam.dk/Papers/Gamle/Culture&Corrupti on.pdf.

Perron, P. (1997). "Further Evidence On Breaking Trend Functions In Macroeconomic Variables". Journal of Econometrics, 80(2): 355-385.

Persson, T., Tabellini, G. & Trebbi, F. (2003). Electoral Rules and Corruption. file:///C:/Users/Tnc/Downloads/48805_20081009_033546_E LECTORAL_RULES_AND_C ORRUPTION20140320150422%20(1).PDF

Phillips, P.C. & Perron, P. (1988). "Testing for a Unit Root in Time Series Regression". Biometrika, 75(2): 335-346.

Rahayu, I. P. & Widodo, T. (2012). The Causal Relationship Between Corruption And Poverty In Asean: A General Method Of Moments/Dynamic Panel Data Analysis". MPRA Paper No.78328. https://mpra.ub.uni-muenchen.de/78328/.

Schmidt, P. & Phillips, P.C.B. (1992). "LM Tests For A Unit Root In The Presence Of Deterministic Trends". Oxford Bulletin of Economics and Statistics, 54(3): 257-287.

Silva, D. O., Ribeiro, L. L., Ferreira, R. T., Costa, E. M., & Castelar, P. U. C. (2022). "Causality Between Corruption And Poverty: An Analysis For South American Countries". Estudios Económicos, 79: 195-218.

Stock, J. H. & Watson, M.W. (2012), Introduction to Econometrics, Pearson.

Tanzi, V. (1995). Corruption: Arm's-Length Relationships and Markets. books.google.com.tr/books?id=DepEk9KiKHsC&pg=PR9&lpg=PR9&dq=corruption+arm%27 s-length+relationships+and+markets&sourc e=.

Tanzi, V. (1998). Corruption Around the World: Causes Consequences Scope and Cures. http://www.imf.org/external/pubs /ft/wp /wp9863 .pdf.

Uberti, L. J. (2022). Income and Corruption (1790-2010). https://dx.doi.org/10.2139/ssrn.4222645.

Uluslararası Şeffaflık Derneği. (2022). 2021 Yolsuzluk Algı Endeksi Açıklandı!

DOİ: *10.38120/banusad.1540238* BANÜSAD, 2024; 7(2), 80-101

https://seffaflik.org/2021-yolsuzluk-algi-endeksi-aciklandi/

United Nations Development Programme. (1997). Human Development Report 1997. http://hdr.undp.org/sites/default/files/reports /258/hdr_1997_en_complete_nostats.pdf.

Ünver, M. & Koyuncu, J. Y. (2016). "The Impact of Poverty On Corruption". Journal of Economics Library, 3(4): 632-642.

Yusuf, M., Malarvizhi, C. A., Mazumder, M. N. H., & Su, Z. (2014). Corruption Poverty and Economic Growth Relationship In The Nigerian Economy. The Journal of Developing Areas, 95-107.

Zivot, E. & Andrews, D. (1992). "Further Evidence on The Great Crash, The Oil-Price Shock and The Unit-Root Hypothesis". Journal of Business Economic Statistics. 10(3): 251- 270.