The Relatıonshıp of Democracy and Envıronment: A Study on Turkey

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Abstract

Democracy is important for societies to live in a cleaner environment and have a better quality of life because people have more freedom to express their rights and thoughts about their quality of life through the media. Carbon dioxide emission data are mostly used in studies on democracy and the environment in Turkey in literature. To contribute to the studies in the literature, ecological footprint data was used in this study for the environmental pollution variable.ARDL analysis was used in the study's econometric analysis to investigate the cointegration relationship between democracy and environmental pollution. According to the ARDL analysis, there is a significant relationship between environmental pollution and democracy.

Keywords: Democracy, Environment,Ecological Footprint, Economic growth

Introduction

Environmental pollution is one of the most serious problems in all countries around the world, as the world's environmental problems worsen. Societal lifestyles and economic activities have an impact on environmental quality and natural balance, and environmental quality and natural balance have both positive and negative effects on societal life (Topal and Günay, 2017: 63). Natural life is under danger and environmental quality is declining as a result of the mindless destruction of environmental values and excessive resource exploitation. As a result of the decline in environmental quality, human life suffers in terms of both maintaining natural life and continuing economic activities.Because economic growth is so important in developing countries like Turkey, production in industries that pollute the environment is increasing rapidly. At the same time, the increase in investments in polluting industries as a result of foreign direct investment rapidly increases environmental damage. Environmental pollution in a country is determined by the distribution of natural resources based on the country's economic activities, labor productivity, production technologies, economic decisions regarding market structure, and political structure, all of which play a role in making these decisions (Congleton, 1992: 412). In democratic countries, people's freedom to use the media and express their rights and opinions about their quality of life has an impact on the political structure. As a result, citizens can influence the political structure's environmental protection policies.Together, democracy and the economy shape the characteristics of countries (Hotunoğlu and Yılmaz, 2018: 134). Societies can realize certain rights and freedoms in countries that have reached a certain level of economic prosperity. Citizens in these countries can work to improve their living conditions and express themselves more freely by defending their rights and freedoms.As a result, countries that have completed their economic development and development processes have a better environment prepared for democracy. Following rapid industrialization and economic growth, societies began to influence social policies in order to improve life quality and leave a more livable environment for future generations. (Hotunoğlu and Yılmaz, 2018: 134). Following rapid industrialization and economic growth, societies began to influence social policies in order to improve life quality and leave a more livable environment for future generations.People in democratic countries have the freedom to express their dissatisfaction and concerns about their quality of life, as well as the opportunity to organize and use the media to influence the political process to address these needs (Drosdowski, 2006: 2). They recognize this opportunity through their choice. People's attitudes toward environmental issues and their perspectives on the future will help country administrators make more environmentally conscious decisions. In democratic countries, media freedom and the principle of transparency in public policies enable the public to easily obtain information about what is going on. As a result of raising public awareness, relevant groups that advocate for environmental laws emerge, and thus environmental awareness can be raised even higher. (Schultz and Crockett, 1990). Thus, the environment is better protected, and a more livable world is created for future generations.Furthermore, radical changes and the dimension of active participation in personal life help to support and develop liberal democratic institutions dealing with environmental issues (Kim et al., 2019). Individuals' awareness of their rights and freedom, as well as their desire for a better quality of life, creates the opportunity to live in a cleaner environment, making it easier for future generations to benefit.

In the literature, some studies conducted with different countries discovered a significant and negative relationship between democracy and environmental pollution, while others discovered no relationship between democracy and environmental pollution. Emissions of carbon dioxide have been used as an indicator of environmental pollution in many studies on democracy and the environment.As a result, the purpose of this study is to investigate the relationship between democracy and environmental pollution in Turkey and to contribute to the literature by utilizing ecological footprint data, which has become increasingly popular in the literature as an environmental pollution indicator in recent years. The study looked at the relationship between democracy and pollution, as well as theoretical explanations. In addition, to demonstrate the validity of the theoretical explanations, the relationship between democracy and environmental pollution was investigated using ARDL cointegration method. A literature review on the environment and democracy is included in the first section of this study, which examines the relationship between environmental pollution and democracy. The model derived from the econometric analysis, as well as the data set of variables used in this model, are explained in the second part.The method used and the results obtained in the econometric analysis section are examined in the third section.Finally, the study's conclusion and policy recommendations are included.

1. Literature review

Many national and international studies on democracy and the environment have been conducted in recent years. According to the findings of the literature review, the democracy index developed by organizations such as Freedom House and Polity is used to assess the overall level of democracy. Although various variables such as ecological footprint, environmental performance index, and carbon dioxide emission are used in studies to measure environmental pollution, carbon dioxide emission is the most commonly used variable. Table 1 summarizes the findings of a review of the literature on national and international studies on democracy and the environment.

When we examine the findings of empirical studies that explain the impact of democracy on the environment, we see that there is a significant relationship between democracy and environmental protection. However, studies by Akalin and Erdoğan (2021) and Carlsson and Lundström (2001) show that democracy has no effect on the environment. According to the findings of the literature review, democracy has a strong and negative impact on the environment in high and middle-income countries but has a very weak impact in low-income countries. People in countries that have reached a certain level of economic development tend to focus on other social goals.They make policymakers and administrators aware of their rights and freedoms, as well as the benefits of a higher quality of life and a cleaner environment.

2.Materials and Methods

2.1. Model and Dataset

Energy consumption and production contribute significantly to environmental damage. As the rate of economic growth increases, so does the consumption of natural resources and energy. As the use of natural resources increases, technology destroys nature, resulting in environmental destruction. As energy use, one of the most important production factors rises, so do toxic gases emitted into the atmosphere, and thus environmental pollution. In addition to economic effects such as economic growth and energy consumption, political effects have both positive and negative environmental consequences.Environmental decisions are made actively by societies in developed democracies. Democratic societies are more sensitive to their citizens' environmental concerns and needs. As a result of this information, it is believed that democracy, economic growth, and energy are effective on pollution.The data variables used in the study are annual data for Turkey from 1976 to 2015. The ecological footprint (ECO) was the dependent variable in the study's model; the rate of increase in national income per capita (GDP), energy use per capita (ENER), and democracy index variables were used as independent variables. Freedom House calculates the democracy index by averaging political rights and civil liberties.This coefficient has a range of 1 to 7. Countries with a coefficient of 1 have the highest level of democracy, while those with a coefficient of 7 have the lowest level of democracy.To make the variables in the model linear, the natural logarithms of the variables were used. Equation 1 depicts the model derived from the study.

$$ECO = \beta_0 + \beta_1 * GDP + \beta_2 * ENER + \beta_3 * DEM + \epsilon_{1t} \quad (1)$$

Table 2 lists the variables used in the model, their explanations, and the sources from which the data for these variables were obtained.

2.2. Method and Application Results

ARDL cointegration analysis was used to investigate the impact of democracy on the environment.To investigate the long-run cointegration relationship between variables, the ARDL (Autoregressive Distribution Lag) boundary test was used.The long and short-run coefficients were then estimated using ARDL analysis, and the CUSUM and CUSUM of Squares tests were used to examine the stability of the variable coefficients.

2.2.1. Unit Root Test

Unit root tests are econometric analysis methods that are used to determine whether a time series is stationary. The stationary series' mean and variance remain constant over time (Stock &Watson, 2011As a result, in a stationary series, increases and decreases occur on a regular basis over time. The Augmented Dickey-Fuller (ADF) unit root test is created by integrating the Dickey Fuller unit root test equation with the lagged value of the dependent variable (Wooldridge, 2013).Table 3 shows the unit root test results for the variables. According to the table's results, the ECO variable is stationary at the I(0) level, while the GDP, ENER, and DEM variables are stationary at the I(1) level, as determined by the ADF unit root test.

In the DF-GLS unit root test developed by Elliot Rothenberg and Stock (1996), the cut-off coefficient and trendare estimated by the generalized EKK method in the first step, then the Dickey-Fuller test is used to test a unit autoregressive root inY_t^d(trend-free Y_t) (Stock& Watson, 2011). The ADF test has been extended to include DF-GLS unit root testing.

The DF-GLS unit root test result was found to be compatible with the ADF unit root test result, the ECO variable was stationary at the I(0) level, and the other variables were stationary at the I(1) level. Because the variables are stationary to varying degrees as a result of the unit root test, the unit root test results are appropriate for ARDL analysis.

2.2.2. Co-integration Analysis

When all of the variables in the model are stationary at the I(1) level or when the variables are stationary at different levels [I(0) and I(1)], ARDL cointegration analysis can be used (Pesaran et al., 2001). The relationship between variables integrated at different levels can be estimated in the long and short run using ARDL cointegration analysis. The ARDL bounds test is performed first in the ARDL test to determine whether there is a cointegration relationship between the variables. The following is how the ARDL bound test results are interpreted:
- ✓ There is a cointegration relationship between the variables when the F statistical value is greater than the upper critical value at the 5% significance level.
- ✓ There is no cointegration relationship between the variables when the F statistical value is less than the lower critical value at the 5% significance level.

Table 4 displays the ARDL bound test and diagnostic test results. The F-statistic value obtained from the table was 6,47.Because the obtained F-statistic value was greater than the upper limit value at the 5% significance level, it was determined that the variables had a long-run cointegration relationship. According to the results of the diagnostic tests obtained from the ARDL model, the model has no autocorrelation or varying variance issues, and the coefficients of the error terms have a normal distribution.

Following the determination that there is a cointegration relationship based on the ARDL bound test result, long and short-run coefficient estimates of the variables were calculated, and the results are shown in Tables 5 and 6. The long-run coefficient estimation results from Table 5 showed a significant long-run relationship between the ecological footprint variable and the variables democracy and energy use. Environmental pollution in Turkey decreases as democracy increases, but as energy consumption increases, so does pollution.

Following the long-run coefficient estimation in ARDL analysis, the CUSUM and CUSUM of Squares tests were used to determine whether the variable coefficients were stable in the long run. According to the CUSUM and CUSUM of Squares test results shown in Figure 1, it was determined that the long-run coefficients were stable during the examined period because the test statistics remained within the critical limits at the 5% significance level.

Short-run coefficient estimation and error correction models were investigated after examining ARDL long-run coefficient estimation and CUSUM tests. Table 6 displays the short-run coefficient estimation results from the ARDL model as well as the CointEq(-1) coefficient results from the error correction run. According to the table, there is no significant relationship between the DEM and the ECO. The ECO variable is found to have a significant and positive relationship with the ENER and GDP variables. As Turkey's energy consumption and per capita income rise, so does pollution. Turkey's primary goal as a developing country is to ensure economic growth. As a result, the environment fades into the background.

The use of natural resources for economic growth is increasing in order to boost output. However, the incidental use of this method increases environmental pollution as well as waste sent for recycling and left to disappear naturally. One of the most important production factors is energy. In Turkey, fossil fuels account for nearly 80% of total energy consumption. As a result, efforts to increase production in order to ensure economic growth in Turkey, as well as increased use of energy factors in this direction, are among the major polluters of the environment.

The model was determined to be significant because the Prob value of the error correction term in the ARDL analysis was less than the Prob value at the 5% significance level. Furthermore, the coefficient of the error correction term was discovered to be -1.05. When the coefficient of error correction term is between -1 and -2, the economic system reaches equilibrium by exhibiting decreasing fluctuations around the equilibrium value in the

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long run (Narayan and Smyth, 2006: 339). In other words, the previous period's imbalances are reduced and eliminated in the following period.

While there was no significant relationship between the democracy variable and the ecological footprint variable in the short run, a negative and significant relationship was found in the long run, according to the ARDL model results. Environmental pollution in Turkey decreases over time as democratization increases. Individuals began to recognize their other needs besides economic needs after Turkey entered a rapid economic growth process. Turkey's recent steps toward sustainable development have also played an important role in this. Environmental awareness has grown as a result of the wish to live in a cleaner environment as part of sustainable development and the desire to reduce environmental pollution.

3.Results and Discussion

The environment has a significant social and economic impact on human life in both developed and developing countries. Excessive resource use and destruction of the natural environment by societies not only harm the environment but also have a negative impact on human life. The increase in mechanization and acceleration of production, particularly after the industrial revolution, resulted in increased consumption of natural resources. The increasing consumption of natural resources damages and destroys the natural environment on a daily basis.

Environmental pollution in a country varies according to production technology, resource distribution, production factors used, economic decisions about market structure, and the political structure that is effective in making these decisions. Citizens have sway over the decision-making of the country's administrators on environmental issues in democratic societies. At the same time, managers in such societies are more sensitive to citizens' environmental concerns and needs. As a result, citizens' opinions and thoughts have an impact on the country's administrators. Societies that have achieved a certain level of prosperity in democratic countries can realize their rights and freedoms and have the freedom to express their thoughts more freely by defending their rights and freedoms on issues such as a cleaner environment and better living conditions. This freedom can be realized through elections or the media. In democratic countries, people's freedom to use the media and express their rights and opinions about their quality of life has an impact on the political structure. As a result, in such societies, it is effective for citizens to influence administrators to make decisions in favor of environmental protection.

The ARDL bounds test was used to examine the long-run cointegration relationship between the variables in the econometric analysis section of this study, which looked at the relationship between democracy and environmental pollution. According to the results of the ARDL bounds test, it was determined that there is a cointegration relationship between environmental pollution and the variables democracy, energy use, and economic growth. The direction of the relationship between the variables was then determined using coefficient estimation. In the long run, an ARDL coefficient estimation revealed a negative and significant relationship between environmental pollution and the democracy variable. Environmental pollution in Turkey is decreasing as democratization progresses. Environmental pollution and energy use were discovered to have a positive and significant relationship. In the short run, there was a positive and significant relationship found between environmental pollution, energy use, and economic growth. In the short run, as economic growth and energy consumption rise, so does pollution. To reduce environmental pollution in Turkey, environmentally sensitive individuals must be raised, as well as public awareness in this direction.Technology and communication tools have advanced rapidly in recent years. Societies are now constantly communicating with one another about social and economic issues. As a result, people have numerous opportunities to raise environmental awareness. It is necessary to raise environmental awareness in societies through social media and other communication tools, as well as to raise individual awareness for a cleaner environment and thus a higher quality of life. Furthermore, in order to achieve a cleaner environment, it is necessary to reduce the share of fossil energy sources, which account for a large portion of energy consumption, and to increase the use of renewable energy sources.

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EK.1: Tablove Şekiller Listesi

Table 1: Empirical Studies on democracy and the environment

Writer(s)/Year	Country	Period	Method	Results
Akalin&Edoğa, 2021	OECD countries	1990-2015	Panel cointegration analysis	democracy has no impact on environmental pollution.
Haseeb&Azam, 2021	Countries with the highest CO_2	1995-2015	Panel cointegration analysis	Increasing democracy in high and middle-income countries reduces CO_2. DEM does not affect CO_2 in low-income countries.
Kim et al., 2019	132 high and low-income countries	2014-2016	Panel cointegration analysis	While it has a significant and strong effect on the environment in high-income countries and a very weak effect on the environment in low-income countries.
Romuald, 2019	122 developing and developed countries	1960-2008	Panel cointegration analysis	democracy hurts the environment.
Ghodrati et al., 2018	Countries with low, high, and medium HDI	2002-2012	Panel cointegration analysis	democracy has a significant and negative relationship on the environment in countries with low human development index, and a significant and positive effect on the environment in counties with med

				ium and high human development index.
Hotuoğlu&Yılmaz,2018	Turkey	1972-2011	Johansen cointegration analysis	democracy affects CO_2 negatively
Lv, 2017	19 developing countries	1997-2010	Panel cointegration analysis	democracy affects CO_2 negatively
Sjöstedt&Jagers, 2014	Sub-Saharan African countries	1970-2006	Panel cointegration analysis	As democracy increases, the protection of marine environments accelerates.
Carlsson&Lundström, 2001	41 high and low-income countries	1977-1996	Panel cointegration analysis	Political freedoms do not have any effect on CO_2 in both developed and developing countries. Economic freedoms have a direct and positive effect in developed countries and a direct and negative effect in developing countries.

Table 2: Explanation and source of variables used in the model.

Data	Explanation	Sources
ECO	Ecological footprint (per person)	Global Footprint Network
GDP	The rate of increase in per capita income(=2010, US$)	World Bank
ENER	Energy use per capita	World Bank
DEM	Democracy index	Freedom House

Table 3: ADF and DF-GLS unit root test results

ADF Unit Root Test			
	Level	First Difference	Result
ECO	-5,03 [-3,52] (0)		I(0)
GDP	-2,12 [-3,52] (0)	-6,25 [-2,93] (0)	I(1)
ENER	-3,06 [-3,52] (0)	-6,37 [-2,93] (0)	I(1)
DEM	-2,66 [-3,52] (1)	-5,29 [-2,93] (0)	I(1)
DF-GLS Unit Root Test			
ECO	-5,01 [-3,19] (0)		I(0)
GDP	-2,04 [-3,19] (0)	-5,22 [-1,94] (0)	I(1)
ENER	-3,12 [-3,19] (0)	-5,52 [-1,94] (0)	I(1)
DEM	-2,50 [-3,19] (1)	-5,35 [-1,94] (0)	I(1)

Values in square brackets indicate t-statistics at 5%, and values in brackets indicate lag lengths. The Schwarz Information Criterion was used in the unit root analysis.

Table 4: ARDL Bound Test

k	F-statistic value	Critical values at a 5% significance level	
3	6,47	Lower limit	Upper limit
		3,23	4,35
Diagnostic tests		Statistics	
R^2		0,970	
Adjusted R^2		0,965	
F-statistics		182,31 (0,000)	
Brusch-Godfrey LM		0,579 (0,633)	
Breusch-Pagan-Godfrey		1,325 (0,273)	
Jague-Bera Normality		0,198 (0,901)	
Ramsey-Reset		2,520 (0,076)	

The lag lengths were determined according to the SIC. Numbers in parentheses indicate probability values.

Table 5: Long-run coefficients obtained from the ARDL(1,1,0,1) model

Variables	Coefficient	Standard Error	T-statistics	Prob
GDP	-0,11	0,12	-0,98	0,33
ENER	0,71	0,13	5,30	0,00
DEM	-0,06	0,69	4,76	0,00
C	-7,93	0,02	-2,78	0,00

Figure 1: CUSUM ve CUSUM of squares tests
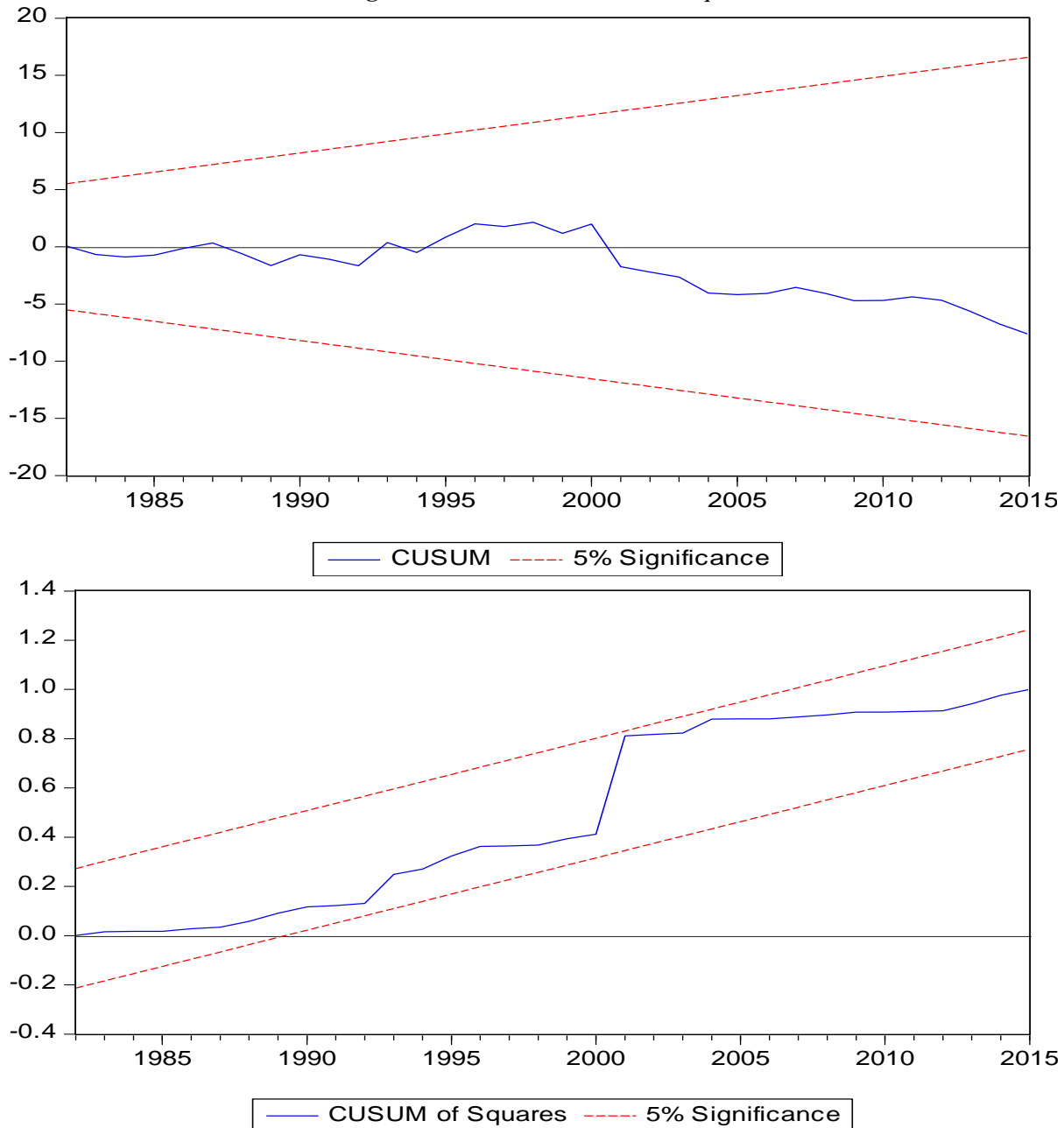
Table 6: Short-run coefficients obtained from the ARDL (1,1,0,1) model

Variables	Coefficients	Standard Error	T-statistics	Prob
GDP	0,37	0,17	2,14	0,03
ENER	0,76	0,15	5,01	0,00
DEM	0,01	0,03	0,45	0,64
CointEq(-1)	-1,05	0,14	-7,47	0,00