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The Impact of Globalization and Financial Development on Environment within the Context of STIRPAT Model: The Case of Turkey*

STIRPAT Modeli Bağlamında Küreselleşme ve Finansal Gelişmenin Çevre Üzerine Etkisi: Türkiye Örneği

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Abstract

Today, the increasing environmental deterioration along with the increasing economic activity has led to an increase in the number of studies addressing this relationship. As a result of the increasing interactions between countries due to globalization, financial mobility has also increased across the world. Although globalization and financial mobility have effects on real variables, they also have an impact on the environment. To see figure out the effects of globalization and financial development on environment, we need to look at their relations with CO2 emissions. Therefore, this study examined the impact of globalization and financial development on environmental deterioration in Turkey, using the modified version of STIRPAT (Stochastic Impacts by Regression on Population, Affluence and Technology) model and the annual data covering the period of 1970-2013. According to the results obtained from cointegration analysis and causality tests, the variables analyzed move together in the long-run.

Keywords: *Globalization, Financial Development, CO2, STIRPAT Model, Cointegration*

Öz

Günümüzde artan ekonomik faaliyetlerle birlikte artan çevresel bozulma, bu ilişkiyi ele alan çalışmaların sayısının artmasına sebep olmuştur. Küreselleşme ile birlikte ülkeler arası artan etkileşimler sonucunda dünya genelinde finansal hareketliliğin de arttığı görülmektedir. Küreselleşme ve finansal hareketlilik her ne kadar reel değişkenler üzerinde etkiler ortaya koysa da çevre üzerinde de bir etki ortaya çıkarmaktadır. Küreselleşme ve finansal gelişmenin çevre üzerindeki etkilerini görebilmemiz için CO2 emisyonu ile olan ilişkilerine bakmak gerekmektedir. Bu nedenle çalışmada 1970-2013 dönemini ele alan yıllık veriler kullanılarak, Türkiye özelinde, küreselleşme ve finansal gelişmenin çevresel bozulmalar üzerindeki etkisine STIRPAT (Stochastic Impacts by Regression on Population, Affluence and Technology) modelinin modifiye edilmiş şekliyle bakılmıştır. Eş bütünleşme analizi ve nedensellik testleri sonucunda elde edilen verilere göre değişkenlerin uzun dönemde birlikte hareket ettikleri sonucu ortaya çıkmıştır.

Anahtar Kelimeler: *Küreselleşme, Finansal Gelişme, CO2, STIRPAT Modeli, Eşbütünleşme*

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Introduction

The relationship between economic growth and environment is one of the growing considerations that economists have put excessive emphasis on in recent years. As the effects of environmental issues such as global warming, air pollution, increased use of natural resources, and CO2 emissions have begun to be felt from the early 1990s, environmental and energy issues in the field of economic growth have gained of primary importance in international platforms. Therefore, today, environmental considerations constitute one of the main agenda items of international arena.

The energy demand of Turkish economy gradually increases due to the increase in economic activity and population growth in recent years. This situation leads to increase in the level of CO2 emissions in Turkey as a developing country, where fossil fuels are heavily used. Some factors such as population growth and increasing economic activity cause increase in mobility from rural to urban areas.

The concept of urbanization is perceived as a migration to areas with a higher level of development and better economic, social and other conditions, offering more residential life opportunity than rural areas. It may not be a right perspective to address urbanization only by focusing on population. Because urbanization has a strong relationship with economic and social structure. The social and economic changes causing population movement and leading to urbanization are important in revealing the concept of urbanization. In this context, urbanization is defined as a population accumulation process which increases the number of cities in parallel with industrialization process and increase in economic activities, and leads to changes in social structure in terms of division of labor, specialization and organization, and also in which the characteristics of that city in question affects human relations in people's behaviors (Uysal and Taş, 2016, p.105-106).

Urbanization, one of the determinants of economic development, has been increasing rapidly in the twenty-first century. The better infrastructure in cities, which is one of the reasons for rural-to-urban migration, increases urbanization, leading to many environmental problems where the population movement takes place. The uncontrolled migration from rural to urban areas also deteriorates economic and environmental order of cities, causing excessive increases in housing prices and prices of municipal services in the cities. Overpopulation in the cities and the uncontrolled industry due to overpopulation cause pollution of the air, water and soil (Özdemir and Özekicioglu, 2006, p.18). Urbanization has also gained momentum with globalization. The increase in population and economic activity in the cities has developed financial system due to the globalization being felt more on the countries.

The financial system is a collectivity that moves together with the institutions, people, tools and organizations existing in the market mechanism, while they are conducting their transactions. The transfer of savings into investments, one of the economically important points, is carried out through the financial system. At the same time, it affects the efficiency of micro- and macro-level transactions in the economy. It also plays a major role in introducing the money and various derivatives of the money into the economic process. Structural and size changes in the financial system indicate financial development (Afşar, 2007, p.189-190).

With the end of the twentieth century, a number of structural transformations have begun to take place in both Turkey and the world. Subsequently, the phenomenon of globalization has begun to affect all countries in terms of economic, social and other conditions. In this period, many countries preferred liberal policies that would facilitate the opening of country borders to foreign capital, due to the imposition of globalization. After 1980, many national economies have implemented liberal policies and shifted to liberal industrialization. Due to the increase of liberal policies in these years, the world financial system has begun to develop and the Turkish financial system has been affected positively from these developments. At this point, economic, sociological and cultural changes taking place in the world along with globalization has affected many areas, and it is an undeniable reality that this process have some effects on the environment too. In addition, it is one of the topics discussed in the literature that increased financial mobility has created an impact on environmental degradation, either directly or indirectly (Öztürk and Özyakışır, 2005).

This study aims to examine the impact of globalization and financial development on environment specific to Turkey, using the modified version of STIRPAT (Stochastic Impacts by Regression on Population, Affluence and Technology) model and the annual data covering the period of 1970-2013. In particular, it aims to obtain more satisfactory results regarding the STIRPAT hypothesis by incorporating variables such as globalization and financial development into the analysis. Thus, this study has tried to eliminate gaps in this area addressing the relationship between CO2 emissions and the control variables such as globalization and financial development in Turkey. This study, in this regard, is separated from the other studies in the literature. The first part of the study presents some discussions on globalization and financial development. The second part mentions about similar studies in the economics literature. The third part examines the STIRPAT Model, the model on which the present study was grounded. The fourth part contains the econometric model and data set. The fifth part contains the tests applied to the model in the section of the evaluation of the econometric method and results, and also includes the results of these tests. The conclusion part gives a general evaluation and presents policy recommendations.

Literature Review

There are many empirical studies on the relationship between environmental degradation and some economic variables, using the STIRPAT model. These studies are observed to have a rapid upward trend especially in recent years. Some of these studies were included in this section.

As a result of their analysis by developing a stochastic version of the traditional IPAT model to examine the effect of population, affluence and technology on carbon emissions; Dietz and Rosa (1997) have shown that factors affecting environmental degradation have led to different effects due to scale differences in countries with large population.

York et al. (2003) combined the STIRPAT model and ecological flexibility measures in order to more accurately examine the sensitivity of environmental impacts to macro-forces. They concluded that population has a direct proportionate effect on carbon emissions and the increased affluence will cause an increase in CO2 emissions. They also reported that urbanization and industrialization increase CO2 emissions.

Cole and Neumayer (2004) found a positive correlation between CO2 emissions and explanatory variables such as population, urbanization rate, energy intensity and household size in a panel study of 86 countries for the period covering 1975 to 1998.

Fan et al. (2006) analyzed the impact of population, affluence and technology on carbon emissions of countries with different income levels, using the STIRPAT model and covering the years between 1975 and 2000. They found that economic growth has the greatest impact on carbon emissions at global level. In addition, they determined that the carbon intensity-lowering effect of energy intensity is greater in low-income countries than in high-income countries.

Li and Li (2010) conducted a panel data study of 30 provinces in China to investigate the average carbon emissions in the period between 1995 and 2007, using the STIRPAT model. They concluded that economic growth has played an important role in carbon emissions, indicating a significant inverse U curve relationship between economic growth and carbon emissions.

Poumanyvong and Kaneko (2010) used the STIRPAT model for regressing population, affluence and technology variables in 99 countries covering the period 1975-2005, to examine the effect of urbanization on energy use and carbon emissions. The study results show that urbanization reduces energy use in low-income country groups but increases energy use in middle and high-income country groups. They also found that although urbanization has a positive impact for all income groups, it has more more significant impact on the middle income group than other income groups.

Li et al. (2012) divided China into five different emission zones to observe the regional factors affecting CO2 emissions. According to the results of the STIRPAT model used in the study, the effect of GDP per capita, industrial structure, population, urbanization and technology level on CO2 emissions varies greatly between the regions.

Zhang and Lin (2012) examined the effect of urbanization on energy consumption, applying the STIRPAT model for China. The study results show that urbanization positively affects energy demand. However, this situation varies between the regions. According to regional results, urbanization reduces energy demand in the West, Central and Eastern regions due to the use of energy-saving technology in these regions.

Sadorsky (2014) analyzed 16 developing countries using the STIRPAT model and covering the period of 1971-2009. The study results show that estimated contemporaneous coefficients on energy intensity and affluence variables are positive and statistically significant.

Li et al. (2015) conducted a study of Tianjin, one of the largest economic centers in northern China, and developed a broad model of stochastic effect, using the population, affluence and technology model, to systematically examine the determinants of CO2 emissions for the period of 1996-2012. The empirical results of their study in which they applied the least squares regression to eliminate the problem of multicollinearity are as follows; the rapid urbanization process has the greatest effect whereas the industrialization level has the least effect on the increase in carbon emissions. In addition, the level of affluence, population size and foreign direct investments play an important role in the increase of CO2 emissions.

Wen et al. (2015) used the stochastic effects model expanded through regression based on the STIRPAT model in their studies. They aimed to reveal the effects of factors affecting CO2 emissions. The study reveals that an increase in industrialization, service, energy consumption structure, urbanization, per capita GDP, capital, investment, foreign trade and technology increases energy consumption and CO2 emissions.

Shahbaz et al. (2016) investigated the impact of urbanization on CO2 emissions by applying the population, affluence and technology regression (STIRPAT) and Stochastic Effects (SSTRPAT) models for Malaysia, and using the data of the period of 1970Q1-2011Q4. The study's empirical results show that economic growth significantly increases CO2 emissions. In addition, energy consumption increases emissions intensity, and capital accumulation leads to increase in energy consumption. Moreover, openness causes richness and therefore increases CO2 emissions. More importantly, this study revealed a U pattern-relationship between urbanization and CO2 emissions.

Adams and Klobodu (2017) examined the relationship between urbanization, political economic variables (democracy and bureaucratic quality) and environmental degradation for 38 African countries, using panel cointegration and causality analysis. As a result, they found that the series were cointegrated. In addition, they determined that democracy and bureaucratic quality are effective in reducing environmental degradation in the long-run. Moreover, they found a positive bi-directional relationship between CO2 emissions and the variables of affluence and population. Finally, they concluded that there was a negative one-way correlation towards bureaucratic quality from CO2 emissions.

STIRPAT Model

Along with the increasing globalization, the environment-economics relation has begun to take place frequently in the economic literature during the late twentieth century. These rapid changes such as technological developments, increase of economic activity, urbanization, and increase of affluence, which have been taking place all over the world, have caused some deterioration in the environment. Along with increasing importance of this relationship, researchers have focused on this area so that the number of relevant studies has increased. This process has also led to the introduction of many models related to this subject. One of them is the STIRPAT model which deals with the impact of urbanization, population, technology and affluence on the environment.

Erlich and Holdren (1971) proposed a model known as IPAT equation for analyzing environmental impact determinants: In the IPAT model: "I" denotes the environmental impact; "P" represents the population size; "A" stands for the affluence; and "T" refers to the state of environmentally harmful technology. In this model, the effects of human activity on the environment were seen as products of these three factors. Initially, this formulation was completely conceptual and was not used to directly test hypotheses on the effect of each of the above-mentioned factors on carbon emissions (Martinez-Zarzoso, 2008, p.7).

The IPAT model and its re-formulated version assume that each factor has a proportional effect on climate change and this effect is created by a limited and certain number of factors. If this limitation is considered as a flaw; then Dietz and Rosa (1997) have stochastically changed the IPAT identity, using the name STIRPAT for stochastic influences with population, affluence and technology strain, to overcome the flaws. This model not only retains multiple relationships between different factors, but also allows disproportionate effects of variables on environmental stress. Moreover, other sociological factors have become empirically testable using an advanced STIRPAT model based on different research findings and objectives (Li et al., 2015, p.1672).

The STIRPAT model is as follows:

$$I = aP^b A^c T^d e$$

Here, I, A, P and T have the same effect as in the IPAT frame; b, c and d are the estimated coefficients of P, A and T, respectively; and e is the error term. However, when a = b = c = d = e = 1, the IPAT equation can be considered as a special form of the STIRPAT model. This model is usually transformed into a logarithmic form to facilitate empirical estimation and hypothesis testing.

The logarithmic state of the STIRPAT model:

$$lnI = a + b(lnP) + c(\ln A) + d(\ln T) + e$$

The effect of socioeconomic factors on environmental degradation is examined in the population, affluence and technology (STIRPAT) model developed by Dietz, Rosa, York and others. Population is often considered as an independent variable to examine its impact on environmental quality. This model corrects the weakness of the environmental Kuznets curves (EKC) where per capita income is used. While environmental degradation and CO2 emissions per capita are deemed as dependent variables, the population maintains its impact on peripheral elasticity. At this point, population elasticity of energy in the developed and developing economies remains the same. If the population elasticity of energy consumption changes in the sample countries, then EKC assumptions are also violated (Shahbaz et al., 2016, p.86).

Econometric Model and Data Set

This study will examine the impact of globalization and financial development on environmental degradation specific to Turkey, using annual data covering the period 1970-2013 and a modified version of the STIRPAT (Stochastic Impacts by Regression on Population, Affluence and Technology) model.

The modified version of the STIRPAT model is as follows:

$$\ln(I_{it}) = bln(P_{it}) + cln(A_{it}) + dln(T_{it}) + fln(U_{it}) + h(G_{it}) + k(F_{it}) + \vartheta_i + \mu_{it}$$

I_{it}, P_{it}, A_{it}, T_{it}, U_{it}, G_{it}, and F_{it}; refer to environmental degradation, population, affluence, technology, urbanization, globalization and financial development, respectively.

The data sets used in the study were obtained from the World Bank and the KOF Index of Globalization databases. In addition, variables used in the model, their abbreviations, units and databases are given in Table 1.

Table 1. Data Set

Variable	Abbreviation	Unit	Database
Carbon Dioxide Emissions	CO2	Metric tons per capita	World Bank
Affluence	LAFF	Per capita income (fixed 2010 US $)	World Bank
Population	NF	Total population	World Bank
Technology	TECH	The added value of the industry (% GDP)	World Bank
Urbanization	URB	Population of the places with more than 1 million people (% total population)	World Bank
Financial Development	FIN	Loans given by banks in the private sector (% GDP)	World Bank
Globalization	GLO	Index Value (1-100)	KOF Index of Globalization

In the study of analyzing the extended-version of the STIRPAT model, it was demonstrated whether the series are co-integrated, investigating whether the series move together in the long-run. Prior to the Johansen cointegration test, the presence of unit root for each series was examined by testing the series for stationarity. After the Johansen cointegration test, the error correction model was used to examine the long and short-run causality. Descriptive statistics giving information about the data sets used in the study are presented in Table 2.

Table 2. Descriptive Statistics

	CO2	FIN	GLO	LAFF	NF	TECH	URB
Mean	2.727	22.18	50.82	8.843	3.318	28.74	26.73
Median	2.717	18.68	49.90	8.829	2.764	28.86	26.60
Maximum	4.419	57.15	70.76	9.462	6.201	33.99	37.26
Minimum	1.222	13.58	31.20	8.347	2.051	22.54	18.11
Std. Dev.	0.915	9.641	14.85	0.304	1.217	3.452	5.651
Skewness	0.200	2.167	-0.018	0.267	0.902	-0.229	0.267
Observations	44	44	44	44	44	44	44

Evaluation of Econometric Method and Results

Unit Root Test

The use of non-stationary series in the analysis leads to reveal of unreal relations between the variables in the model. Therefore, whether the series are stationary or not is examined. The stationarity tests for the variables were performed using the ADF unit root test and the results are shown in Table 1.

When the ADF test results in Table 1 are examined, it is seen that the series are not stationary. The first-order differences of the series were taken to ensure their stationarity. As a result, it was decided that all of the series are I (1). In this case, there is no problem to make the cointegration test.

Johansen Cointegration Test

Taking the differences of series in order to recover them from the unit root can cause the series to lose

Table 3. Unit Root Test Results (ADF)

Level Values

		CO2	FIN	GLO	LAFF	NF	TECH	URB
Intercept	**t-Stat**	-0.4423	2.7499	-0.4076	0.4172	-1.7340	-1.9635	0.5491
	Probability	***0.8924***	***1.0000***	***0.8987***	***0.9815***	***0.4073***	***0.3013***	***0.9864***
Intercept and Trend	**t-Stat**	-2.9953	1.4391	-1.8149	-2.0607	-2.5859	-1.9694	-5.3727
	Probability	***0.1453***	***1.0000***	***0.6801***	***0.5523***	***0.2884***	***0.6010***	***0.0004***

1. Difference Values

		d(CO2)	d(FIN)	d(GLO)	d(LAFF)	d(NF)	d(TECH)	d(URB)
Intercept	**t-Stat**	-6.5010	-4.0014	-6.4641	-6.1510	-4.2921	-6.9224	-2.6119
	Probability	***0.0000****	***0.0034****	***0.0000****	***0.0000****	***0.0015****	***0.0000****	***0.0988*****
Intercept and Trend	**t-Stat**	-6.4155	-4.7548	-6.3807	-6.1750	-4.2360	-6.8770	-5.4115
	Probability	***0.0000****	***0.0022****	***0.0000****	***0.0000****	***0.0089****	***0.0000****	***0.0005****

their relations with each other. The cointegration theory deals with examining whether linear combinations of the series with unit roots contain unit roots. If there is a stationary relation in the linear combinations of the series, then it is necessary to check their long-run joint movements. In the cointegration analysis, the series do not have to be stationary, and in this case it can be said that there is a long-run relationship between the series. If the series are cointegrated, they are affected by a common stochastic trend. Therefore, a regression to be formed in this way will be meaningful. In the Johansen cointegration test, all of the series have the same degree of stationarity, and are analyzed with Vector Auto Regression, which contains the lagged values of the variables (Tarı and Yıldırım, 2009, p.100)

Johansen cointegration test was applied to examine whether the variables with same degree of stationarity move together in the long-run. To be able to apply Johansen cointegration test, the optimal lag length was found using the Schwarz information criterion. As shown in Table 4, the optimal lag length is taken as one (1) according to the Schwarz information criterion.

After determining the lag lengths shown in Table 4, the Johansen cointegration test was applied, and the results are presented in Table 5.

Table 4. Lag lengths

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-388.1979	NA	0.555923	19.27795	19.57051	19.38448
1	-75.67599	503.0841	1.51e-06	6.423219	8.763707*	7.275496
2	7.489634	105.4783*	3.52e-07	4.756603	9.145019	6.354622*
3	69.56347	57.53184	3.49e-07*	4.118855*	10.55520	6.462617

Table 5. Johansen Cointegration Test

Hypothesis	Trace Statistic	Critical Value (5%)	Probability	Max. Eigenvalue Statistic	Critical Value (5%)	Probability
r=0*	167.2378	134.6780	0.0002*	64.60040	47.07897	0.0003*
r ≤ 1	102.6374	103.8473	0.0600	33.45154	40.95680	0.2719
r ≤ 2	69.18582	76.97277	0.1692	26.46233	34.80587	0.3479
r ≤ 3	42.72349	54.07904	0.3414	18.19818	28.58808	0.5589
r ≤ 4	24.52531	35.19275	0.4294	11.94524	22.29962	0.6602
r ≤ 5	12.58007	20.26184	0.3983	7.340040	15.89210	0.6278
r ≤ 6	5.240031	9.164546	0.2581	5.240031	9.164546	0.2581

*indicates that Ho is rejected.

The results presented in Table 5 indicate a long-run relationship between the series for the maximum eigenvalue test and the trace test. For the main hypothesis (r=0) assuming no cointegrated vector, the maximum eigenvalue is 64.60, and the critical value at the 5% significance level is greater than 47.07. On the other hand, the trace test value is 167.23, and the trace test critical value at the 5% significance level is greater than 134.67. According to the results, there is a long-run relationship between the series at the 5% significance level for the trace statistic and maximum eigenvalue statistic. In addition, there is at least one co-integrated vector among the series in the model. The resulting values from the tests showing that there is more than one co-integrated vector in the model are smaller than the critical values. Therefore,

Table 6. Normalized Cointegration Vectors by CO2

CO2	LAFF	NF	TECH	URB	GLO	FIN	C
1.0000	-2.8425	-0.1039	-0.0016	0.0486	-0.0280	0.0143	22.517
	(0.470)	(0.027)	(0.007)	(0.026)	(0.006)	(0.003)	(3.558)
	(-6.037)**	(-3.834)**	(-0.226)	(1.810)*	(-4.564)**	(4.080)**	(6.328)**

*indicates that the coefficients are significant at 10% level.

**indicates that the coefficients are significant at 5% level.

it is concluded that there are no more than one co-integrated vector among the series, indicating only one co-integrated vector. When the co-integrated vector obtained from the analysis is normalized according to the CO2 variable, the equation shown in Table 6 is obtained.

In the co-integrated vector normalized according to the CO2 variable, of which coefficients are given in Table 6, the coefficients of population, affluence, globalization, financial development and fixed term were found to be significant at 5% level, but the coefficient of urbanization were found to be significant at 10% level.

If the vector is expressed in the form of equations;

$$CO2 = 22.51701 + 2.842599\ LAFF + 0.103955NF + 0.001631TECH - 0.048632URB + 028072GLO - 0.014321FIN$$

According to the vector coefficients, a 1% increase in affluence increases CO2 emissions by 2.84%. A 1% increase in population increases CO2 emissions by 0.1%. A 1% increase in urbanization reduces CO2 emissions by 0.04%. A 1% increase in globalization increases CO2 emissions by 0.02%. A 1% increase in financial development reduces CO2 emissions by 0.01%

Error Correction Model

After revealing the existence of a long-run relationship between the variables used in the model and determining the direction in which this relationship was established, the error correction model will be used to test how long the deviation from the equilibrium takes to be corrected, and also to determine whether there is a relationship between variables in the short-run. The significance of the error correction term (EC (-1)) indicates that the error correction model works. The coefficient of the error correction term indicates its direction. That is, a positive coefficient of the term indicates that the series move away from the equilibrium, and a negative coefficient of the term indicates that the series approach to the equilibrium (Tarı and Yıldırım, 2009, p.103).

Table 7. Error Correction Model Results

EC(-1)	Δ(CO2(-1))	Δ(LAFF(-1))	Δ(NF(-1))	Δ(TECH(-1))	Δ(URB(-1))	Δ(GLO(-1))	Δ(FIN(-1))
-0.400	-0.226	-0.742	-0.077	0.022	0.114	-0.012	0.030
(-3.047)	(-0.962)	(-0.986)	(-1.418)	(1.568)	(1.957)	(-0.835)	(2.959)
[0.004]	[0.342]	[0.330]	[0.165]	[0.126]	[0.058]	[0.409]	[0.005]

The results shown in Table 7 were obtained as a result of the error correction mechanism established between the series. According to the results presented in Table 7, the coefficient of the error correction term is determined to be significant and negative in the 5% confidence interval according to the error correction model in which carbon dioxide emission is used as a dependent variable. According to this result, the short-run changes of the series approximate the series closer to the equilibrium in the long-run, and the gap between the series decreases by 40% every year. That is, the series reach to the equilibrium within an average of 2.5 years.

Again according to the results of the short-run causality obtained in this model, there is a causality relationship between financial development and CO2 emissions at a significance level of 5%, whereas there is a causality relationship between urbanization and CO2 emissions at a significance level of 10%.

Conclusion

This study analyzed the impact of globalization and financial development on environmental deterioration specific to Turkey, using the extended version of STIRPAT model and the annual data covering the period of 1970-2013. Johansen cointegration test and error correction model were used as the analysis method. A cointegrated relationship was found between CO2 emissions and other variables included in the model. That is, the series move together in the long-run. In addition, the results from the error correction model reveal that the short-run movements in the variables approximate the series to the equilibrium in the long-run, and it is expected that this correction will take place within 2.5 years.

It was expected in the literature that an increase in population, affluence or globalization would increase CO2 emissions. The results obtained from the analysis also show that for the case of Turkey, the increases in population, affluence and globalization increase CO2 emissions. The relevant literature reports that the relationship between urbanization and CO2 varies by country, and that urbanization in developing countries generally reduces CO2 emissions. This study reached a result consistent with the literature, stating that an increase in urbanization reduces CO2 emissions. The study found that an increase in financial development reduces CO2 emissions. This result is a consequence which may arise due to the reduction in the consumption of fossil-based energy sources.

The increase in environmental degradation arising from the increase in population, affluence and globalization is because of improper functioning of the national institutions. The fact that policy makers ignore environmental elements in the policies they applied, causes the increases in these elements to adversely affect the environment. The fact that protective measures for the environment are not sufficiently dissuasive or the fact that environmental protection measures are not adequately supervised, increases environmental degradation. Enhancing the deterrence of environmental protection measures, increasing the supervision of imposed environmental bans, and taking the environment as the first element and shaping other policies around it will contribute to reduce environmental degradation.

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