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# Macroeconomic Factors Affecting the Volume of Consumer-Based Problem Loans in Turkey: Analysis through Econometric Methods with Structural Breaks

*Türkiye`de Tüketici Bazlı Sorunlu Kredi Hacmine Etki Eden Makro İktisadi Faktörler: Yapısal Kırılmalı Ekonometrik Yöntemler ile Analiz*

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## ABSTRACT

In the study, an empirical application was conducted to examine the macroeconomic factors affecting the problematic loan volume, taking into account the structural breaks and using current time series methods. Explanatory variables such as loan interest, real effective exchange rate and public spending were used. Both conventional and structural break unit root tests were applied to examine the stationarities of the variables. The long-term relationship between the variables was examined with the Maki (2012) test with structural break and a cointegration matrix was found according to all 4 models. The structural break dates found to explain the economic shocks experienced in Turkey's economy for the relevant months. The long-term relationship between variables was estimated with the FMOLS methods. According to the estimator results, while CPI and public expenditures variables were found to be statistically insignificant, a positive relationship was found between all the other variables and the dependent variable. In addition, Hacker-Hatemi-J Bootstrap causality test was applied, and a one-way relationship from problematic credit volume to CPI, one-way relationship from loan interest and total loan volume to problem loan volume, and a two-way relationship between public expenditures and problem loan volume were found.

## Anahtar Kelimeler:

Sorunlu krediler,  
yapısal kırılmalı  
birim kök testleri,  
maki eşbütünleşme

## ÖZET

Çalışmada sorunlu kredi hacmini etkileyen makro iktisadi faktörleri incelemek amacı ile yapısal kırılmaları dikkate alan ve güncel zaman serisi yöntemleri ile ampirik uygulama yapılmıştır. Tasfiye edilecek tüketici kredilerini sorunlu kredi hacmi değişkeni olarak belirlendiği modelde, bu değişkeni açıklamak için TÜFE, isgücü, toplam tüketici kredilerin, tüketici kredi faizi, reel efektif döviz kuru ve kamu harcamaları gibi açıklayıcı değişkenler kullanılmıştır. Değişkenlerin durağanlıklarının incelenmesinde hem geleneksel hem de yapısal kırılmalı birim kök testleri uygulanmıştır. Değişkenler arasındaki uzun dönemli ilişki yapısal kırılmalı Maki (2012) testi ile incelenmiş ve her 4 modele göre eşbütünleşme matrisi bulunmuştur. Bulunan yapısal kırılma tarihleri o aylar için Türkiye ekonomisinde yaşanan iktisadi şokları açıklar nitelikte bulunmuştur. Değişkenler arasındaki uzun dönemli ilişki FMOLS modeli ile tahmin edilmiştir. Model sonuçlarına göre TÜFE ve kamu harcamaları değişkenleri istatistiksel olarak anlamsız bulunurken, diğer tüm değişkenler ile bağımlı değişken arasında pozitif ilişki saptanmıştır. Bunun yanı sıra Hacker-Hatemi-J Bootstrap nedensellik testi uygulanmış ve sorunlu kredi hacminden TÜFE'ye doğru tek yönlü, kredi faizlerinden ve toplam kredi hacminden sorunlu kredi hacmine doğru tek yönlü, kamu harcamaları ile sorunlu kredi hacmi arasında ise çift yönlü ilişki bulunmuştur.

## 1. INTRODUCTION

While problem bank loans are one of the main problems of the banking sector, they also create an imbalance in financial markets in general. Especially, the credit bubbles that have occurred with the growing financial sector in recent years have brought about the problem of not paying loans on time or not paying at all. This problem, following a growing trend in the banking sector in Turkey in recent years, influences macro-economic indicators and is also influenced by macro-economic indicators.

The growth of the problematic loan base affects the financial sector in the country, especially bank profitability. The formation and growth of problem loans, their becoming chronic for the financial sector, and the fact that this situation is experienced not only in a few banks but also in both public and private banks affect the finance sector deeply. We can explain the concept of the problem loan as the failure of the individual, commercial or mortgage loan to be paid on time, or in general, the borrower's being unable to pay the loan due to any reason. A loan can turn into a problem loan due to many different reasons such as the debtor's having inadequate assets, loss of health, the inability of the commercial enterprise to make a profit that will create the ability to pay, death of the debtor, not being able to reach the debtor, in general, due to the debtor's losing the ability to pay the debt. In this case, banks or non-bank financial institutions initiate a legal process for the recovery of the bad debt or accept that the debt cannot be paid in cases where recovery is impossible.

The main reasons for the growth of the problem loan base are the uncontrolled growth of the loan volume, the inadequacy of credit rating, the wrong credit policies of banks, an economic crisis or a natural disaster in the country, a decrease in the economic indicators and a decrease in the income in general. Seen from this perspective, it is observed that problem loans have the potential to create a crisis and an economic crisis has the potential to increase the volume of problem loans. That is, there is also mutual causality between problem loans and economic crises (real or financial crisis).

In general, it is accepted that the growth in the volume of loans leads to a proportional increase in problem loans. The stretching of the credit conditions by an expanding financial sector as a result of an expansionary monetary policy implemented in a country sometimes leads to incorrectly chosen credit rating policies. As a result of the emerging loan bubble, the bank profitability decreases because of debtors' inability to pay their loans resulting from the above-mentioned and other conditions, and banking crises are experienced as a result of the functional deterioration in banks. Financial crises also occur as the banking crises experienced create twin crises by causing the money crisis. In other words, an increase in the volume of problem loans may lead to significant financial crises.

The current study aims to conduct an empirical analysis of problem bank loans from a macro-economic perspective. In general terms, the current study is devoid of banking terms and a banking perspective of problem loans in both the theoretical and empirical parts because the aim of the study is to establish a relationship between problem loan base and macroeconomic indicators. In the time series analysis conducted to this end, the cointegration and causality relationship between macro-economic variables and the volume of problem loans in the period between January 2014 and January 2021 will be examined. In the current study, first, a short review of the literature of different empirical studies conducted in Turkey and abroad for the problem of bank loans was made. In addition, a brief background assessment of problem bank loans from an economic perspective was performed. An original model and a new method were tried by evaluating the methods and results of the studies mentioned in the literature review. By using new generation time series methods in the estimation of the relevant model, it was aimed to produce more consistent results and to make a significant contribution to the literature in terms of the period covered and new variables.

## 2. A MACROECONOMIC PERSPECTIVE OF CONSUMER-BASED PROBLEM LOANS

The concept of problem loans is also classified as "frozen receivables", "non-performing loans", "loans to be collected", "receivables to be liquidated" in the provisions legislation. The word problem loan can also be defined as "the delay of collection and the emergence of the possibility of loss due to the significant deterioration of the repayment agreement between the bank and the debtor." (Selimler, 2015). If the loan allocated fails to return to the bank, if the bank cannot restructure the loan and cannot establish any dialogue with the customer to solve the problem, or the borrower is unable to pay the loan, these loans become problem loans and often cause the bank to initiate legal proceedings. We can evaluate the problem loan process in four separate stages: early warning, pre-



administrative, administrative and legal stages. In the period between the early warning stage and the legal stage, the structuring options between the bank and the customer are reviewed, if this process cannot be accomplished, the loan is tried to be recovered by legal means (Yücememiş and Sözer, 2011).

Incorrectly rated credit risks, unsuitable credit policies, flexibility in credit terms, credit bubbles due to low credit interest generally result in an increase in consumer loans. This increase also leads to increasing risks in the collection of loans. Ignorance of the age criterion during the lending process, not determining the ability to pay correctly according to income and employment status, and loans given without taking similar risks into account can cause difficulties in the collection of loans in the future. The difficulties that banks face in getting back their loan payments create negative externalities for banks, particularly for their profitability. While the non-repayment of bank loans is a sign of financial risk, it also indicates that the economic power of the consumer is decreasing. The inability of the debtor's income source to pay the loan due to events such as natural disasters, political or economic shock, and epidemiological situation in the country is another reason that creates problem loans (Yüksel, 2016:5).

While problem loans affect macroeconomic factors, they are also affected by macroeconomic factors. Positive movements are expected in the economic factors that will affect the income level of the borrower in order to reach the level of income required for the individual borrower to be able to pay the loan or to reach the level of income intended while receiving the loan. For example, it is an accepted view in theory that increases in public expenditures and money supply, which generally increase the income level of the population, including loan payers, have a positive effect on the income level. In addition, an increase in employment and positive movements in inflation are variables that have a positive effect on social income. In other words, economic occurrences that generate or increase income can have an alleviating effect on the problem of loans that arise when the debtor cannot pay his/her debt due to economic difficulties. On the contrary, the income contraction and the inflation effect may occur due to the increase in the exchange rate and may decrease the borrower's ability to pay loans by creating a decrease in his/her income. Such macroeconomic phenomena have direct and indirect effects on the individual borrower's ability to pay loans.

### 3. LITERATURE REVIEW

The problem loan volume is also defined as the non-performing loan volume or the impaired loan volume. In the literature, there are time series, panel data and survey studies investigating the economic factors affecting this volume and affected by this volume. In this section, the results of some seminal empirical studies investigating the relationship between the volume of problem loans and macroeconomic variables only within the context of Turkey adopting a macroeconomic perspective are briefly summarized.

Koyuncu and Berrin (2011) examined the relationship between the non-performing loan volume and the volume of loans invested in the private sector for the period between 1986 and 2008, and a reducing effect was determined according to the results of the Method of Least Squares (MLS). Şahbaz and İnkaya (2014) examined the relationship between non-performing loans and domestic loan volume, real growth, private consumption expenditures and private fixed capital expenditures for the period over 1998Q2-2012Q3. In the study created with the Vector Autoregression (VAR) method, the cointegration relationship between the series and Granger causality was encountered. In the study by Altınöz (2018), the relationship between loan loss rates and macroeconomic variables was examined. According to the results of the time series analysis, it was seen that the increase in the M3 money supply and interest rate decreased the loan loss provision.

Radivojević et al. (2019) estimated the critical macro and microeconomic factors affecting troubled credit volume for Latin American countries with the Generalized Momentar Estimator. According to the results of the study, there was no significant relationship between the variables.

Tandon et al. (2017) estimated bank-specific, macroeconomic determinants of non-performing loans and their effects on banking profitability. In the period of 2007-2016, multivariate panel data analysis for 35 Indian public and private banks was performed using panel data through fixed effect regression and modified ordinary least squares and system GMM approach was discussed. According to the results, inflation and unemployment are the main determinants of bad loans in India.

In the Mazreku et al. (2018) study, macroeconomic factors affecting problematic banking loans for transition economy countries were also examined. According to the findings, GDP growth and inflation were found to be both negatively and significantly related to non-performing loans.

Yüksel (2016) examined the relationship between non-performing loan volume and macroeconomic variables for the period between 1998 and 2014. The Multivariate adaptive regression spline (MARS) method was used in the study conducted with a total of 13 variables. According to the results of the model, it was seen that the increase in the exchange rate increased the non-performing loan volume, while the economic growth and interest income of the banks decreased the relevant volume.

Çiftçi (2016) examined the relationship between monthly data for the period over 2006-2015 and variables such as rate of change in the Consumer Price Index (CPI), output gap, monetary aggregates, overnight interests between banks and non-performing loans using VAR analysis. According to the analysis results, the relationship between the macroeconomic variables and bad loan volume varies according to bank groups.

Baş and Kara (2020) investigated the relationship between the variables of exchange rate and inflation and non-performing loans with ARDL analysis. The study, covering the period 2005Q4-2017Q4 in Turkey, concluded that the increase in the real effective exchange rate also increased the nonperforming loans in both the short and long term.

Kuzu and Çelik (2019) examined the relationships between the problem loans of 25 commercial banks operating in the banking sector of Turkey between the years 2005 and 2018 and real effective interest rate, gross domestic product (GDP), return on assets, real exchange rate (RER), asset size, commercial credit interest rate, share of Turkish currency loans, the Stock Exchange İstanbul-100 (BIST) index, deposit to loan ratio, interbank overnight average interest rate, capital adequacy ratio, rate of inflation = speed of change in CPI, return on equity, monetary size = monetary base / CPI, loan growth rate, unemployment rate, and the share of consumer loans. While a positive correlation was found between the variables of the rate of inflation, the share of consumer loans, capital adequacy ratio and the dependent variable, a negative correlation was found between deposit to loan ratio and BIST 100 index and the dependent variable.

Torun and Altay (2019) analyzed the micro and macroeconomic variables that led to the problematic loans of 25 commercial banks for the period 2008-2015. As a result of the balanced panel analysis, inflation, unemployment rate, real exchange rate, GDP growth rate, GDP growth rate of the Euro zone and the BIST Index as macroeconomic variables and the real effective interest rate, capital adequacy ratio, the share of consumer loans as microeconomic variables were found to be related to problem loans.

In their study, Kabataş and Karamustafa (2019) examined the relationship between the rate of consumer-based problem loans and macroeconomic and bank-specific microeconomic variables in the period over 2005Q1–2016Q4 in Turkey. As a result, a negative and statistically significant relationship was found between the variables of growth, unemployment and equity / total assets ratio and the problem loan ratios in consumer loans of the Turkish banking sector.

#### 4. EMPIRICAL ANALYSIS

In the empirical part of the study, macroeconomic factors affecting the consumer-based problem loan volume are analyzed using current time series methods. In this context, consumer loans to be liquidated both in Turkish Lira and in foreign currency have been determined as dependent variables. The period to be evaluated within the scope of the current study was evaluated by considering the period in which all variables in the model were observed continuously and without loss. The data set of the study is comprised of monthly data consisting of 89 observations covering the period between January 2014 and February 2021. All of the data were compiled from the Central Bank Electronic Data Distribution Centre (CBEDDC). “Eviews 9.0”, “Rats” and “Gauss 21.0” package programs were used in the estimation of the model.

As it was intended to conduct a study that takes into account structural breaks and shocks in macroeconomic variables, current methods with structural breaks were preferred. In this context, the stationarity tests of the variables were carried out with the Extended Dickey-Fuller (ADF) and Phillips-Perron tests, which are the most common tests in the literature and are important tests in time-series studies, and Zivot and Andrews (1992), Lumsdaine and Papell (1997), Lee and Strazicich (2003, 2004) and Carrion-i-Silvestre (2009) tests, which allow structural breaks, were applied. After the stationarity tests, the cointegration analysis under multiple structural breaks developed by Maki (2012) was performed and the long-term relationship was estimated with the FMOLS estimator. The causality analysis between variables was conducted with a causality analysis developed by Hacker and Hatemi (2006) using bootstrap simulations.

As the variables were by different percentages, they were included in the model by taking the natural logarithm of all the variables in the model and seasonally adjusting them. In addition, the trend-including Public Expenditures (Central Government Budget Expenditures) – Thousand TL (LNGOVR) series was freed from the trend. Descriptive information about the variables is given in the table 1:

**Table 1.** Measurement of Variables

Definition of the Model	Its Name in the Model
Consumer Loans to be Liquidated (TLYp)(Thousand TL)	LNBDLOAN
Labour – Level	LNLABOUR
Consumer Price Index (General) – Level	LCNPCI
CPI Based Real Effective Exchange Rate (2003=100) – Level	LCNRE
Personal Loan Interest (Opened in TL and Foreign Currency)- %	LCNINT
Total Loan Volume (Thousand TL) – Level	LCNTOTLOAN
Public Expenditures (Central Government Budget Expenditures) – Thousand TL	LCNGOVR

It is a theoretically accepted view that the increase in macroeconomic variables in the model macroeconomically provides stability or decreases the stability. Since the increase in the volume of problem loans poses a macroeconomic threat, that is, it is considered as a crisis indicator, factors that make it difficult to pay the loan or that contribute to the formation of a situation in which loans cannot be paid are evaluated. Within the framework of theoretical expectations, based on the perspective that the increase in the labour force has a positive macroeconomic effect, it is expected that a change in this variable will cause a decrease in the problem loan volume, while an increase in the real effective exchange rate and CPI is expected to have an increasing effect on the problem loans. In addition, a negative relationship is expected between an increase in public expenditures and the problem loan volume when seen from the perspective that the increase in public expenditures will have a positive effect on the individual's income.

#### 4.1. Stationarity Tests

Economic and financial variables are often not stationary. Estimates that do not consider stationarity lead to spurious regression (Göktaş, 2015: 66). The effect of any shock that occurs in stationary series is not permanent. The concept of stationarity is generally explained as the invariance of the variance, covariance and mean of the series over time. For this reason, before progressing onto econometric estimation, it should be tested whether the stochastic process that makes up the series remains stationary over time. The ADF developed by Dickey-Fuller (1981) and the test developed by Phillips-Perron (1988) are the most preferred consistent and basic tests used in stationarity testing.

The ADF test is a test statistic that has an autoregressive process that includes the lagged values of the dependent variable as an independent variable and is decided according to the results of the T statistic. While determining the appropriate lag level of the lagged variable in the ADF test, Akaike Information Criterion (AIC), Schwartz Bayesian Criterion (SBC) and Hannan-Quinn Criterion (HQC) are used (Göktaş, 2005:67). Below are given the models of the test without constant and trend, without constant and with trend, and with constant and trend:

$$\Delta Y_t = \delta Y_{t-1} + \sum \delta_i \Delta Y_{t-1} + (1) \quad [\text{without constant and trend}]$$

$$\Delta Y_t = \mu + \delta Y_{t-1} + \sum \delta_i \Delta Y_{t-1} + \varepsilon_t \quad (2) \quad [\text{without constant and with trend}]$$

$$\Delta Y_t = \mu + \beta T + \delta Y_{t-1} + \sum \delta_i \Delta Y_{t-1} + \varepsilon_t \quad (3) \quad [\text{with constant and trend}]$$

Phillips-Perron (1988) test is a unit root test that is mostly applied to financial data and developed on the Dickey-Fuller process. The PP test contains more flexible assumptions than the ADF test. The ADF test assumes terms homogeneous, while the PP test allows weak dependent and heterogeneous distribution of error terms. All three structures of the PP test are given in the following equations:

$$Y_t = \delta Y_{(t-1)} + u_t \quad (4) \quad [\text{Without constant and trend}]$$

$$Y_t = \beta_1 + \delta Y_{(t-1)} + u_t \quad (5) \quad [\text{With constant}]$$

$$Y_t = \beta_1 + \delta Y_{(t-1)} + \beta_2(t-T/2) + u_t \quad (6) \quad [\text{With constant and trend}]$$

In the following table 2, the results of the ADF test conducted by considering 11 delays and decided according to the SBC criterion and the results of models with constant and with constant and trend of the Newey-West corrected PP test are presented:

**Table 2.** ADF and PP Test Results

VARIABLE	ADF		PP	
	With constant	With constant and trend	With constant	With constant and trend
LNBDLOAN	-1.6431 0.7674	1.0083 0.9164	-1.6480 0.7654	2.2521 0.9940
ALLNBDLOAN	-4.2717 0.0056**	-2.9533 0.0036**	-10.1687 0.0000*	-8.2146 0.0000*
LNLABOUR	-2.1996 0.4833	0.7912 0.8818	-2.4979 0.3285	0.9141 0.9025
ALNLABOUR	-6.6315 0.0000*	-7.0392 0.0000*	-3.5218 0.0097*	-3.5676 0.0005*
LNCPI	-1.7773 0.7067	4.4675 1.0000	-1.6288 0.7733	8.2100 1.0000
ALNCPI	-5.5317 0.0001*	-1.3155 0.0001*	-6.8287 0.0000*	-4.0137 0.0001*
LNGOVR	-6.4426 0.6010	6.0177 1.0000	-6.4261 0.2050	1.7359 0.9795
ALNGOVR	-5.7326 0.0000*	-13.8955 0.0000*	-25.6773 0.0001*	-23.5257 0.0000*
LNRE	-4.1064 0.1090	-1.0908 0.2476	-3.3177 0.1703	-0.9205 0.3149
ALNRE	-7.0656 0.0000*	-7.0038 0.0000*	-5.6724 0.0000*	-5.8042 0.0000*
LNINT	-2.5125 0.3216	-0.1545 0.6274	-2.1088 0.5333	0.1591 0.7298
ALNINT	-5.4727 0.0001*	-5.5366 0.0000*	-5.5445 0.0001*	-5.6096 0.0000*
LNTOTLOAN	-2.1318 0.5207	-1.7773 0.7067	-2.5164 0.3197	5.4672 1.0000
ALNTOTLOAN	-7.7638 0.0000*	-5.8254 0.0000*	-7.7598 0.0000*	-6.0574 0.0000*

\*Indicates the significance level of 1%. \*\* indicates the significance level of 5%.

\*, \*\*, \*\*\* indicates the significance level of %10, %5, %1

According to the results of both the ADF and PP tests for all the variables in the model, the  $H_0$  hypothesis arguing the presence of the unit root in the series could not be rejected because the T statistic values calculated at the level values were greater than the critical values at the 5% significance level. However, when the first differences of the series were taken, it was seen that the T statistic values calculated at these values were smaller than the critical value, that is, the  $H_0$  hypothesis was rejected. As a result, it was determined that all series were not stationary at level values according to the ADF and PP tests, but became stationary at I (1) values.

Unit root tests, which take structural breaks into account, were applied after conventional unit root tests. Zivot and Andrews (1992) developed a unit root test, which determines the date of structural break internally. The ZA test is a unit root test that allows a single break under three different models named as model A, model B and model C occurring in three different types of break; break in constant, break in constant and trend and break in trend. Within the retro-perspective of the unit root models, the ZA model is criticized as it is a single break model and Lumsdaine and Papell (1997) tests, which are built on this model and allow two structural breaks, have been developed.

Zivot and Andrews (1992) Lumsdaine and Papell (1997) models are with a series of unit root, assume that there is no structural break in the null hypothesis and the critical values are found according to this assumption. To solve this problem, following the ZA and LP tests, Lee and Strazicich (2003, 2004) developed unit root tests with structural breaks whose minimum Langrange Multiplier (LM) allows one and two breaks (Gövdeli, 2016).

As a result of the crises experienced in different periods in the economy and the occurrence of many structural breaks due to shocks caused by political events and other reasons, the unit root tests with structural break were found to be insufficient in terms of long-term analyses. The structural break tests which were developed by Carrion-i-Silvestre et al. (2009) and which determine the structural break dates internally and allow up to five

breaks have eliminated this deficiency. The CS test obtains the structural break dates by using the algorithm in Bai and Perron (2003) method and by minimizing the sum of error squares with dynamic programming methods with the help of the Q-GLS method. The CS test consists of five different test statistics and these test statistics are produced by the bootstrap method.

The table 3 below gives the results of the ZA test that determines the structural break dates internally and allows a single structural break:

**Table 3: ZA Test Results**

<b>VARIABLE</b>	<b>Model A (Break in</b>	<b>Model B (Break in Trend)</b>	<b>Model C (Break in Constant and</b>
<b>LNBADLOAN</b>	-2.27763	-2.28348	2.28844
	2019:11	2019:08	2019:05
<b>LNLABOUR</b>	-4.49070	-4.79954	-4.50740
	2019:11	2019:03	2019:01
<b>LNCPI</b>	-3.51720	-3.08562	-3.68904
	2018:07	2016:08	2018:07
<b>LNRE</b>	-5.4305	-1.80012	-3.32947
	2019:06	2018:08	2018:05
<b>LNINT</b>	-3.74041	-1.11500	-3.32947
	2019:06	2016:04	2018:05
<b>LNTOTLOAN</b>	-3.61717	-3.23072	-4.49740
	2018:08	2020:01	2019:05
<b>LNGOVR</b>	2.91738	3.51382	2.80653
	2018:11	2016:08	2018:03
<b>Critical values are the significance level of 1% and 5%</b>	-5.34 -	-4.80	5.57
	-4.93 -	4.42	-5.08

Hypotheses related to the ZA test are given below:

H0: The series contains unit root without structural break

H1: The series is stationary with a structural break

As a result of the ZA test, when the t-statistics at 5% and 1% significance level in all the three models are compared with the ZA critical values, the  $H_0$  hypothesis cannot be rejected because the test statistic is smaller than the critical value in terms of absolute value. In this context, since the T statistic value calculated at the structural break dates determined for all the variables is smaller than the critical values at both 5% and 1% significance level, it has been concluded that the series contains unit root without a structural break. Lumsdaine and Papell (1997) developed a unit root test that takes into account two structural breaks.

**Table 4.** Lumsdaine and Papell Unit Root Test

VARIABLE	Model A (Break in	Model B (Break in Trend)	Model C (Break in Constant and
LNLABOUR	-5.0577	-6.1197	-5.5416
	2018:10 2020:01	2018:03 2019:08	2018:04 2019:05
LNCPI	-5.2640	-5.2640	-2.3808
	2016:01 2018:07	2016:01 2018:07	2016:07 2018:07
LNRE	-2.4659	-2.8612	3.5779
	2015:09 2018:03	2017:08 2018:08	2018:08 2018:03
LNINT	-5.4305	-4.0777	-5.7279
	2018:05 2019:06	2017:08 2018:08	2018:07 2019:12
LNTOTLOAN	-5.0874	-4.7255	-4.9806
	2018:09 2020:02	2018:08 2019:09	2018:04 2019:05
LNGOVR	-5.3982	-5.1425	-6.3629
	2017:11 2018:11	2017:09 2018:12	2016:11 2017:11
LNBADLOAN	-3.4303	-3.4493	-4.3991
	2015:04 2020:02	2015:07 2020:01	2015:04 2019:05
Critical values are the significance level of 1% and 5%	-6.74	-7.19	-7.19
	-6.16	-6.62	-6.75

The LP test uses the same hypotheses as the ZA test and a decision is made by comparing the T statistic values with the critical values by using the same method. According to the findings, when two structural break periods are taken into consideration in all variables, the  $H_0$  hypothesis established as “The series contains unit root without structural break” cannot be rejected because the calculated absolute T statistic values are smaller than the critical values at 1% and 5% significance level.

Although it was assumed that there was no structural break in the unit root null hypothesis in the LP and ZA tests and this assumption was investigated with critical values, the minimum Langrange Multipliers unit root test was developed by Lee and Strazicich (2003, 2004). This test was developed as two separate tests allowing both one structural break and two structural breaks. In other words, although unit root methods that take a structural break into account were used until the LS test, with the LS test, the unit root test that allows structural break was introduced to the applied literature. The hypotheses of the LS test are as follows:

$H_0$ : The series contains unit root with structural breaks

$H_1$ : The series is stationary with structural breaks

**Table 5.** Lee and Strazicich Unit Root Test with One Break and Two Breaks

VARIABLE	Results of the Test with One Break		Results of the Test with Two Breaks	
	Model A (Break in Constant)	Model C (Break in Constant and Trend)	Model A (Break in Trend)	Model C (Break in Constant and Trend)
LNLABOUR	-1.9754	-4.4012	-1.5007	-6.8761
	2020:06	2019:12	2018:10 2020:07	2019:01 2020:01
LNCPI	-1.4245	-3.0261	-4.3674	-1.6139
	2018:06	2018:06	2017:09 2018:10	2017:10 2018:06
LNRE	-3.2624	-1.8242	-4.7596	-4.1673
	2018:05	2018:07	2018:06 2019:01	2017:09 2019:03
LNINT	-2.8140	-3.5934	-3.2657	-5.9076
	2019:07	2019:04	2018:10 2019:07	2018:04 2019:09
LNTOTLOAN	-3.4978	2.8149	-3.6516	-4.9053
	2018:09	2018:09	2018:09 2020:05	2018:07 2020:02
LNGOVR	3.8768	4.3793	-4.4290	-3.4545
	2016:03	2017:05	2016:09 2019:04	2015:04 2018:02
LNBADLOAN	-3.3694	-0.9763	-3.9866	-1.1370
	2015:10	2017:07	2015:03 2017:12	2017:07 2018:11
Critical values are the significance level of 1% and 5%	-4.029033	-4.8532	-4.0730	-6.7500
	-3.430333	-4.2889	-3.5630	-6.1080

The fact that the LM test statistic values calculated for all the variables according to the results of the LS test with one break and two breaks were higher than the critical values at 1% and 5% significance level in the model that allows breaking in both constant, constant and trend, led to the conclusion that the  $H_0$  hypothesis cannot be refuted. This confirms the hypothesis that there is a unit root under structural break for all series. As a result, the results of the LS test with one break have once again confirmed the ADF, PP and ZA and LP test results with a structural break. While the ZA, LS and LM tests, which are the unit root tests with the structural break, allow one and two structural breaks, Carrion-i-Silvestre et al. (2009) (CS) test allows five structural breaks and the structural break dates can be determined internally by the test method. The CS test was applied in the next step.

**Table 6.** Carrion-i-Silvestre (CD) Test with Structural Break

VARIABLE	Level Value					Structural Break Dates
	PT	MPT	MZA	MSB	MZT	
<b>LNBDLOAN</b>	7.11 [9.41]	6.48 [9.41]	-12,12 [-17.45]	0,29 [0.09]	-3,31 [-4.7]	2015:03 2017:12
<b>LNLABOUR</b>	6.56 [9.41]	6.83 [9.41]	-14,64 [-17.45]	0,40 [0.09]	-2,16 [-4.7]	2017:03 2019:01
<b>LNCPI</b>	7.61 [9.41]	7.34 [9.41]	-11,39 [-17.45]	0,35 [0.09]	-3,52 [-4.7]	2015:06 2016:09
<b>LNRE</b>	8.43 [9.41]	9.30 [9.41]	-10,26 [-17.45]	0,45 [0.09]	-2,66 [-4.7]	2016:08 2017:09
<b>LNINT</b>	8.67 [9.41]	8.95 [9.41]	-12,48 [-17.45]	0,43 [0.09]	-1,97 [-4.7]	2018:04 2017:03
<b>LNTOTLOAN</b>	7.27 [9.41]	7.45 [9.41]	-12,28 [-17.45]	0,35 [0.09]	-2,03 [-4.7]	2016:07 2018:09
<b>LNGOVR</b>	7.78 [9.41]	5.34 [9.41]	-15,35 [-17.45]	0,23 [0.09]	-3,39 [-4.7]	2016:09 2019:04
<b>ΔLNBDLOAN</b>	11.5 [9.41]	11.3 [9.41]	-28.90 [-17.45]	0.03 [0.09]	-5.6 [-4.7]	
<b>ΔLNLABOUR</b>	19.6 [9.41]	20.3 [9.41]	-31.44 [-17.45]	0.07 [0.09]	-7.8 [-4.7]	
<b>ΔLNCPI</b>	15.7 [9.41]	15.3 [9.41]	-25.93 [-17.45]	0.03 [0.09]	-5.1 [-4.7]	
<b>ΔLNRE</b>	33.6 [9.41]	37.8 [9.41]	-39.48 [-17.45]	0.02 [0.09]	-6.7 [-4.7]	
<b>ΔLNINT</b>	26.9 [9.41]	28.3 [9.41]	-21.84 [-17.45]	0.08 [0.09]	-8.5 [-4.7]	
<b>ΔLNTOTLOAN</b>	18.4 [9.41]	17.6 [9.41]	-28.41 [-17.45]	0.06 [0.09]	-5.3 [-4.7]	
<b>ΔLNGOVR</b>	26.3 [9.41]	25.7 [9.41]	-31.36 [-17.45]	0.01 [0.09]	-9.4 [-4.7]	

\* The values in parentheses are the critical values found as a result of 1000 replications using the bootstrap technique. The variable with the symbol “Δ” in front of it is the first differentiated variable of the series. Break dates of variables are given only in level values.

According to the results of the CS test and according to the PT, MPT, MZA, MSB and MZT test statistics, it was concluded that the series was not stationary in the level values, and I (1) was stationary in the first differences.

According to both the ADF and PP unit root test results and the ZA, LP, LM and CS (according to all test statistics) tests performed under the structural break, all the variables were found to be non-stationary in level values, and stationary in case of I (1). This situation makes it possible to investigate the cointegration relationship between variables.

## 4.2. Cointegration Analysis

Macroeconomic variables are structurally affected by significant conjunctural changes in economies and non-economic events. In this case, the relevant series diverges from the line it has maintained up to now. Ignoring this situation, which is explained as a structural break in empirical studies, reduces the consistency of the related estimates. Especially in recent years, in econometrics studies, the opinion that studies conducted with current structural break methods, which replace the traditional unit root, cointegration and causality tests, yield more consistent results compared to traditional methods is dominant. Structural break tests have improved with the increase in the number of structural breaks, allowing the calculation of consistent test statistics with the use of bootstrap techniques.

The use of cointegration analysis with structural break started with Gregory and Hansen (1996) method, and further developed by Carrion-i-Silvestre and Sanso (2006) and Westerlund and Edgerton (2006) methods. While these tests have developed cointegration vectors that allow a structural break, the Maki (2012) test allows for up to five structural breaks. That is, it predicts the long-term relationship in the presence of five structural breaks. This method, in which the structural break dates are determined internally, determines the possible breaking point for each period and determines the points where T is minimum among the T statistic values calculated for those



periods and chooses those points as the structural break dates. The Maki (2020) test is currently known in the literature as the cointegration test that allows the most structural breaks, and as a superior method to the Gregory and Hansen (1996) and Hatemi-J (2008) tests. Maki (2012) developed four models to determine the co-integration relationship under the structural break.

Studies to examine the existence of a cointegration relationship between series under the presence of structural breaks started with Gregory and Hansen (1996), followed by Carrion-i-Silvestre and Sanso (2006) and Westerlund and Edgerton (2006). While one structural break in the cointegration vector can be taken into account in these tests, Maki (2012) developed a method that can test the presence of cointegration between series in the presence of up to five structural breaks. This method can also calculate the structural break dates internally. In particular, when there are three or more structural breaks in the cointegration equation, this method is superior to the Gregory and Hansen (1996) and Hatemi-j (2008) methods (Maki, 2012). In the working algorithm of the test, each period is taken as a possible breaking point, t statistics are calculated and the points where t is minimum are accepted as the breaking point. Maki (2012) developed four different models in order to test whether there is a cointegration relationship between series in the presence of structural breaks.

Model 0: The model where a break is allowed in the constant term:

$$Y_t = a + \sum_{i=1}^k a_i + D_{i,t} + \beta X_t + e_t \quad (7)$$

Model 1: The model where a break is allowed in the constant term and slope:

$$Y_t = a + \sum_{i=1}^k a_i + D_{i,t} + \beta X_t + \sum_{i=1}^k \beta_i X_i D_{i,t} + e_t \quad (8)$$

Model 2: The model with a trend where a break is allowed in the constant term and slope:

$$Y_t = a + \sum_{i=1}^k a_i + D_{i,t} + \gamma t + \beta X_t + \sum_{i=1}^k \beta_i X_i D_{i,t} + e_t \quad (9)$$

Model 3: The model where a break is allowed in the constant term, slope and trend:

$$Y_t = a + \sum_{i=1}^k a_i + D_{i,t} + \gamma t + \sum_{i=1}^k \gamma_i t D_{i,t} + \beta X_t + \sum_{i=1}^k \beta_i X_i D_{i,t} + e_t \quad (10)$$

The  $D_i$  variable here shows the dummy variables that explain the structural break dates. The critical values required for the Maki (2012) test are derived through Monte Carlo simulation. The hypotheses of the test are as follows:

$H_0$ : There is no cointegration relationship under structural breaks between series.

$H_1$ : There is a cointegration relationship under structural breaks between series.

To test the hypotheses, the calculated test statistic values are compared with the absolute critical value. Maki (2012) cointegration test results are given in the table 7:

**Table 7.** Maki (2012) Cointegration Analysis

Model	Test Statistics	Critical Values			Break Dates
		%1	%5	%10	
<b>Model 0</b>	-7.143*	-6.640	-6.132	-5.892	2016:1,2018:7,2020:8
<b>Model 1</b>	-7.067*	-7.053	-6.494	-6.220	2016:7,2018:7,2020:7
<b>Model 2</b>	-9.490*	-9.441	-8.869	-8.541	2018:7,2019:8,2020:7
<b>Model 3</b>	-11.043*	-10.08	-9.482	-9.151	2018:8,2019:5,2020:08

\*Indicates the significance level of 1%.

The fact that the test statistics calculated according to the results of all four models are greater than the critical values at 1%, 5% and 10% significance levels in terms of the absolute value means that the  $H_0$  hypothesis is rejected. Given that Model 2 is preferred more in the literature, a cointegrated relationship is also found in model

2. Determination of a cointegration relationship for all the models shows that the estimation to be made with the level values of the series will be consistent. Although Maki (2012) test can detect up to 5 structural breaks, 3 structural breaks were determined for all the models. The emergence of this situation can also be evaluated as the statistical and econometric success of the model established. The fact that the same results emerged for all the unit root tests at all three levels of significance is one of the indicators that make the model prediction successful. At the same time, we see that the structural break dates determined according to all models are close to each other. For example, the periods 2020:7 and 2020:11 are the structural break dates found for all the models.

There is the variable of GDP per capita in the study that measures the relationship between multi-question loans and macroeconomic variables in the literature. The reason why this variable is not included in the model within the scope of the current study is that the study is conducted with the same frequencies (monthly). However, the Ramsey Reset test was applied in response to the identification error caused by keeping an important variable outside the model, and the  $H_0$  hypothesis that "There is a specification error in the model" was rejected as a result of the comparison of the calculated F statistic values (2.293143,  $P = 1.3339$ ) with the critical values at the relevant degree of freedom. In other words, there was no specification error found in the model that could be caused by excluding any variable from the model.

The Fully Modified Ordinary Least Squares (FMOLS) method, developed by Phillips and Hansen (1990), is an estimator based on a semi-parametric correction method that takes into account the intrinsic relationship between independent variables and the error term and the autocorrelation problem between error terms. The FMOLS estimator is a consistent method that is successful in a small number of observations and is an asymptotically non-deviating method (Küçükaksoy et al., 2006: 751). Long-term coefficients were estimated with the FMOLS estimator. In this context, the model where the structural break dates in Model 2 were taken as dummy variables, which is the most preferred model in the literature and where a cointegration relationship was encountered at the three levels of significance, was estimated.

**Table 8.** Results of the FMOLS Cointegration Estimator

VARIABLE	Coefficient	Test statistic	Probability
<b>LNTOTLOAN</b>	1.097527	6.634482	0.0000*
<b>LNCPI</b>	-0.149463	-0.557617	0.5787
<b>LNINT</b>	0.119612	2.376389	0.0200*
<b>LNGOVR</b>	0.044954	0.913489	0.3638
<b>LNLABOUR</b>	1.116837	3.482328	0.0000*
<b>LNER</b>	0.372849	3.436425	0.0010*
<b>D2018:7</b>	0.044929	2.371426	0.0202*
<b>D2019:9</b>	0.056578	3.074151	0.0029*
<b>D2020:7</b>	-0.051000	-2.587297	0.0116*
<b>Constant</b>	-7.740704	-4.505250	0.0000*

\* Indicates the significance level of 5%.

According to the results of the model whose F statistic was significant (864.71,  $P = 0.000$ ) and the explanatory level was high ( $R^2 = 0.95$ ), the LNCPI and LNGOVR variables were found to be statistically insignificant (1%, 5% and 10% significance level). When the dummy variables showing the structural break dates were included, the other variables and constant were found to be significant. Economically, we can interpret the results of the FMOLS estimator as follows:

- 1% increase in total loan volume increases the volume of problem up to by 1.09.
- 1% increase in loan interest increases the volume of problem loans up to by 0.11.
- 1% increase in workforce increases the volume of problem loans up to by 1.11.
- 1% increase in the effective exchange rate increases the volume of problem loans up to by 0.37.
- Within the framework of the relationship between the variables, shocks that caused structural breaks were experienced in July 2018, September 2019 and July 2020. The shocks experienced in 2018 and 2019 were

found to have a positive effect on the problem loan volume, while the shock experienced in 2020 was found to have a negative effect.

The structural break dates found within the scope of the current study explain the shocks affecting the variables in the Turkish economy in the related periods and affected by these variables. There occurred significant exchange rate fluctuations in Turkey in July of 2018 and September of 2019 and these exchange rate fluctuations have affected many aspects of the economy. The multi-dimensional effects of Covid-19, which started to spread across Turkey since March of 2020, have affected the Turkish economy in many respects and have led to the emergence of structural changes on the relevant series. However, while the economic problems experienced due to the COVID-19 pandemic were expected to positively affect the problem loan volume, which is a problem indicator, the determination of a reducing effect is an unexpected economic result. In addition, a positive relationship was found between the increase in the workforce and the problem loan volume, contrary to the expectation of a negative relationship. Except for the LNLABOUR and 2020:7 dummy variable, the relationship between the other variables and problem loan volume is considered to be an economically expected and significant relationship.

### 4.3. Causality Analysis

Hacker-Hatemi-J (2006) applied Todo-Yomamoto (1995) test against possible normal disintegration with critical values calculated by the bootstrap technique. The test developed by Hachker and Hatemi-J (2006), as in the Todo-Yomamoto (1995) test, tests that there is no Granger causality among the variables in the null hypothesis and that there is the Granger causality among the variables in the alternative hypothesis (Ulucak, 2014:14). The Hacker-Khatami-J (2006) test tests the causality between variables using the Vector Autoregressive Model (VAR) between variables:

$$Y_t = a + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + \dots + A_{p+d} Y_{t-p-d} + u_t \quad (11)$$

The sequence p in the process is known and d equals to the maximum number of integrations of variables. Hypothesis tests are performed by comparing the Wald test statistic value calculated in Hacker-Hatemi-J (2006) test with the values of Khatami distribution obtained by the bootstrap method. In the test, the appropriate delay length is decided according to the information criterion (HJC), which consists of the combination of the Schwarz information criterion (SBC) and the Hannan-Quin (HQC) information criterion developed by Khatami-J (2003).

The results of the test performed with the critical values found with 10000 replications through the Bootstrap technique and with 3<sup>rd</sup> delay length obtained by adding 1 to the 2<sup>nd</sup> delay length selected according to the VAR model and HJC information criterion are given in the table below:

**Table 9.** Results of the Hacker-Hatemi-J (2006) Bootstrap Causality Test

DIRECTION OF CAUSALITY	MWALD statistics	Bootstrap Critical Value		
		%1	%5	%10
<b>LNBADLOAN→LNLABOUR</b>	0.587969	10.042	6.745	4.962
<b>LNLABOUR→LNBADLOAN</b>	22.85983*	9.870	6.540	4.827
<b>LNBADLOAN→LNCPI</b>	11.28568*	10.739	6.539	4.561
<b>LNCPI→LNBADLOAN</b>	3.927539	12.831	7.095	5.130
<b>LNBADLOAN→LNRE</b>	0.473535	12.673	7.018	5.042
<b>LNRE→LNBADLOAN</b>	0.905394	10.830	6.481	4.741
<b>LNBADLOAN→LNINT</b>	0.879002	9.895	5.038	4.217
<b>LNINT→LNBADLOAN</b>	8.875933*	9.673	5.013	4.183
<b>LNBADLOAN→LNTOTLOAN</b>	0.972073	10.531	6.692	4.721
<b>LNTOTLOAN→LNBADLOAN</b>	27.65959*	10.439	6.971	4.818
<b>LNBADLOAN→LNGOVR</b>	5.459710***	9.514	6.104	4.582
<b>LNGOVR→LNBADLOAN</b>	11.04296*	9.386	6.051	4.345

\* Indicates the significance level of 1%.

\*\* Indicates the significance level of 5%.

\*\*\*Indicates the significance level of 10%.

According to the test results, there is a one-way causality relationship from labour to problem loan volume, one-way causality relationship from problem loan volume to CPI, one-way causality relationship from loan interest

and total loan volume to problem loan volume, and two-way causality relationship from public expenditures to problem loan volume (10% significance level).

## RESULTS

The increasing problem loan volume as a result of macro reasons such as failure to measure credit risks correctly, looseness in banks' credit policies, natural disasters in the country, traumatic shocks in the economy, policies resulting in a reduction in national income, macroeconomic instability, unemployment, inflation, and the rise in the exchange rate pose a threat to the banking sector and therefore to the financial and real economy. The formation of problem loans creating financial instability is one of the main reasons for financial crises.

In the current study, the analysis of the macroeconomic variables affecting problem loan volume was conducted by using monthly data covering the period between January 2014 and March 2021 in Turkey. Since the study approached problem credit volume only from a macroeconomic perspective, micro variables unique to the banking sector were not included in the model. The study was conducted with the empirical expectation that positive macroeconomic changes would have a decreasing effect on problem loans by identifying problem loans as a negative phenomenon. In this context, it is expected that the increase in the variables of labour and public expenditures in the model has a positive economic effect in terms of improving the ability to pay a debt, and the economic expectation has been that these variables will have a decreasing effect on the dependent variable. Based on the view that the problem loan is generally caused by a disproportionate and inappropriate credit risk rating in the loan volume, a negative relationship was expected between an increase in the total loan volume and the problem loan volume as a result of the conviction that the reason for the increase in loan volume is because of the inappropriate credit rating to a certain extent and that problem loan generally arises from the presence of loan. In addition, due to the fact that high loan interest rates, which are one of the main reasons that make loan payments difficult, lead to problem loans, it is expected that an increase in loan interest rates will lead to an increase in problem loan volume. A positive relationship was predicted between problem loans and real exchange rate and inflation, which are the variables most emphasized in empirical studies on problem loans and affect the income level of the public.

In the time series analysis study, first, the stationarity of the series was examined. In this context, the variables were subjected to both the traditional unit root tests ADF and PP, and the unit root tests ZA, LM, LP and CS, which are the unit root tests with a structural break. In all the tests, it was concluded that the series was not stationary at level values according to all the models, yet stationary at the I (1) level. In this case, with the conviction that a cointegration relationship between series is possible, the Maki (2012) cointegration test with structural break was conducted. According to the results of the test, a cointegration vector was found under the structural break in all four models. Model 2 was preferred and the coefficients were estimated by using the FMOLS estimator, where the structural break dates of 2018: 7, 2019: 8, 2020: 7 in this model were added as dummy variables. Properly chosen structural break dates in the model were found to be statistically significant and to coincide with the exchange rate shocks and the negative effects of COVID-19 experienced in Turkey in these periods.

In the model, the CPI and public expenditure variables were not found to be statistically significant. Apart from the conclusion that the increase in the workforce leads to an increase in the volume of problem loans, the results showing that the other variables, which are increases in the exchange rate, the total loan volume, and loan interest rates, lead to an increase in problem loans are found to be economically significant. Since the FMOLS method is a predictor resistant to standard errors, diagnostic test results were not given. The findings obtained support the results of the Çiftçi (2016) and Yüksel (2016). While the CPI variable was found to be statistically significant in the study by Kuzu and Çelik (2019), it was found to be insignificant in the current study. The results related to the real effective exchange rate variable support the studies by Torun and Altay (2019) and Altınöz (2018).

According to the results of the Hacker-Hatemi-J (2006) Bootstrap Causality test, there is one-way causality relationship from labour to problem loan volume, one-way causality relationship from problem loan volume to CPI, one-way causality relationship from loan interest and total loan volume to problem loan volume, and two-way causality relationship from public expenditures to problem loan volume. The result of "Problematic Loan Volume is the Granger Cause of Public Expenditure" is considered to be economically unexpected and considered as a statistical coincidence. The results other than this result were interpreted as economically expected results.

The study was conducted on macroeconomic factors affecting the problem credit volume with new econometric methods that cover the monthly and most recent period and have advanced qualities. The study is an up-to-date

study approaching the problem loan volume that poses both macroeconomic and financial threat from an empirical and economic perspective and it also includes unit root analysis with structural break and cointegration analysis and current causality test and bootstrap technique with Kacker-Hatemi-J; thus, it is believed to make some contributions to the relevant literature and shed light for further macroeconomic studies.

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## Halal Cosmetic Awareness Among College Students in Malaysia

*Malezya'da Üniversite Öğrencileri Arasında Helal Kozmetik Farkındalığı*

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### ABSTRACT

Halal certification is the significant driver of halal cosmetic awareness in Malaysia. All cosmetic manufacturers must obtain halal recognition from the Malaysian Department of Islamic Development (JAKIM) to produce halal cosmetics in Malaysia. Nevertheless, do halal recognition is a matter for cosmetic users among Gen-Z's college students in Malaysia? This paper intends to examine the halal cosmetic awareness among Gen-Z's students. This paper used the Malaysian Islamic Social Financial Literacy Quiz (MISFL 2020) data supplied by Persatuan Mahasiswa Kelantan Universiti Malaya (PMKUM) to understand the halal cosmetic awareness among college students in Malaysia nationwide. Gen Z's college students are the young generation born between the year 1997 – 2003. Their lifestyle is different from the previous generation. Therefore, this study conjectured that their awareness of halal recognition for cosmetics might also yield a different outcome than previous generations. The quiz questions were adapted from the study of Ambo (2020). The sample consisted of 313 quiz participants, and the findings indicate that most of them are ultimately aware of halal recognition for cosmetics although they do not receive any formal education regarding halal cosmetics. Bumiputera (Malays and Malaysia Peninsular natives) students aged 20-21 years old who pursued Bachelor Degree showed better halal cosmetic scores. The results suggest they should be served with a wide range of cosmetics in the market, and it is the role of halal cosmetic providers to convince them that halal cosmetic brand is the superior solution. The research is authentic in its data derived from the MISFL 2020 quiz competition. Since the college institutions in Malaysia do not mandate students to enrol in halal education, it is conjectured that the college students' demographics could help design awareness campaigns regarding halal cosmetics beyond traditional learning style.

### Anahtar Kelimeler:

Farkındalık,  
üniversite öğrencisi,  
halal kozmetik,  
JAKIM, Malezya

### ÖZET

Helal sertifikası, Malezya'da helal kozmetik bilincinin önemli bir itici gücüdür. Tüm kozmetik üreticileri, Malezya'da helal kozmetik ürünleri üretebilmek için Malezya İslami Kalkınma Departmanından (JAKIM) helal onayı almalıdır. Yine de, Malezya Z kuşağı üniversite öğrencileri kozmetik kullanıcıları için helal tanıma bir sorun mudur? Bu makale, Z kuşağı öğrencileri arasındaki helal kozmetik farkındalığını incelemeyi amaçlamaktadır. Bu makale, ülke çapında Malezya'daki üniversite öğrencileri arasındaki helal kozmetik farkındalığını anlamak için Persatuan Mahasiswa Kelantan Universiti Malaya (PMKUM) tarafından sağlanan Malezya İslami Sosyal Finansal Okuryazarlık Testi (MISFL 2020) verilerini kullanmıştır. Z kuşağının üniversite öğrencileri 1997 – 2003 yılları arasında doğan genç kuşaktır. Yaşam tarzları bir önceki kuşaktan farklıdır. Bu nedenle, bu çalışma, kozmetikler için helal tanıma konusundaki farkındalıklarının da önceki nesillerden farklı bir sonuç verebileceğini varsaymıştır. Araştırma soruları Ambo'nun (2020) çalışmasından uyarlanmıştır. Örneklem 313 bilgi yarışması katılımcısından oluşmaktadır ve bulgular helal kozmetik ile ilgili herhangi bir eğitim alınmamasına rağmen, çoğu katılımcının helal kozmetiğin farkında olduğunu göstermektedir. Lisans eğitimi alan 20-21 yaş grubundaki Bumiputera (Malezyalılar ve Malezya Yarımadası yerlileri) öğrencilerinin helal kozmetik puanları daha iyi performans göstermiştir. Sonuçlar, piyasada geniş bir kozmetik yelpazesi ile hizmet verilmesi gerektiğini ortaya koymakta ve helal kozmetik sağlayıcılarının helal kozmetik markası üretmelerinin önemli bir çözüm olacağını göstermektedir. Araştırmada, MISFL 2020 bilgi yarışması yarışmasından elde edilen özgün veriler kullanılmıştır. Malezya'daki kolejler, öğrencileri helal eğitim konusunda zorlamadığından üniversite öğrencilerinin demografik özelliklerinin geleneksel öğrenme yöntemlerinin ötesinde helal kozmetik ürünlerinin tanınmasına yönelik farkındalık kampanyaları tasarlanmasında rol oynayacağı düşünülmektedir.

## 1. INTRODUCTION

It has defined halal cosmetics as entirely free from animal-derived ingredients based on natural ingredients. It also must be ablu-tion -friendly and safe to be used by cosmetic users (Siti Mashitoh, Rafida, & Alina, 2020; Badarudin, 2019; Low, 2017). All cosmetic manufacturers must obtain halal recognition from the Malaysian Department of Islamic Development (JAKIM) to produce halal cosmetics in Malaysia (Mustafar, M. Ismail, Othman, & Abdullah, 2018). Given above, cosmetic users who are mentally insightful of the halal in the cosmetic items must ensure that the cosmetics bought are utterly free from animal-derived ingredients, based on natural ingredients, ablu-tion -friendly, safe to use, and also recognised by JAKIM (Osman & Aziz, 2018).

The importance of having a high level of halal cosmetic awareness primarily to prevent them from procuring and consuming non-*shariah* compliance cosmetics. The importance of halal cosmetic awareness is even more apparent for college students who are the most frequent cosmetics users (Teng & Wan Jusoh, 2013). They are the people born between 1997 and 2010 who are known as Generation Z (Gen-Zers) (McCrindle, 2021). Compared to Generations X and Y in Malaysia, the Gen-Z cohort as a whole tends to appreciate more arts, literature, music, and fashion (Mothersbaugh & Hawkins, 2016). Since their interest in arts, literature, music, and fashion in tandem with the application of make-up, it is not too exaggerated that the cosmetic industry will generate RM 42.41 billion (USD 10.5 billion) of halal cosmetic in Malaysia in 5-years' time (HIMP, 2020). Thus, Persatuan Mahasiswa Kelantan Universiti Malaya (PMKUM) launched the Malaysian Islamic Social Financial Literacy Quiz (MISFL 2020) quiz across a wide range of Malaysia to address Islamic social financial literacy among Malaysians. PMKUM invited the researchers of this article to design four questions regarding halal cosmetics together with other researchers of Islamic Social Finance such as *zakat* & *waqf* (Islamic wealth management) and *takaful* (Islamic insurance). Specifically, this article seeks to contribute to halal cosmetic awareness literature, particularly among college students in Malaysia, described by their sociocultural constructs. The article's findings imply that quiz participants scored 90.2%, in which most of them are ultimately aware of halal cosmetic products.

The remainder of this article as follows. Section 1.1 discusses the overview of halal cosmetics in Malaysia, followed by a literature review on halal cosmetic awareness in Malaysia in Section 2. The purpose of PMKUM in organising MISFL 2020 in Section 3. The data and methods are described later in Section 4, followed by the limitations and discussion of the empirical analysis and findings in Sections 5 and 6. The article end-up with a summary of the results and suggests avenues for future research in Section 7.

### 1.1 Overview of halal cosmetic in Malaysia

About 61.3 percent of Malaysians are Muslim (Department of Statistics, 2017; Ayob, Awadh, Jafri, Jamshed, S. Ahmad, & Hadi, 2016; Abdul Aziz & Chok, 2013; Kling, 1995). It means that the predominant view among Muslims in Malaysia is crucial for societal well-being (Kling, 1995). Much of the Malaysia Government's efforts is oriented towards mostly Muslims, such as imposing a specific limitation on gambling, alcohol, and pork-rearing. Higher demands by Muslims for halal products induce halal cosmetics' further supply (Al-Bayan, 2020; Abdul Aziz & Chok, 2013; Siti Mashitoh *et al.*, 2013). JAKIM was empowered by Malaysia Government with RM 1 billion in 2018 for assuring Muslims towards consuming only halal items (Teoh, 2017). Recognition for halal items in Malaysia illustrates better shariah governance and regulations (Mustafar *et al.*, 2018; Ramli, 2015; Ahmad, Tunku Abaidah, & Abu Yahya, 2013). As an avant-garde with a deep understanding of Islamic and conventional finances, Malaysia is perceived as an international hub for halal cosmetics in tandem with the abundance of organic herbal ingredients for cosmetics.

This research could detect the first involvement of the halal cosmetics brands such as Zaitun and Safi early as the 1980s (Mustafar *et al.*, 2018). Several years forward, with more significant proliferation of Islamic finance in Malaysia, Malaysia has attracted many international cosmetic manufacturers to set up halal cosmetic operations in Malaysia (Kaur, Osman, Kaur, & Singh, 2018; Ayob *et al.*, 2016; Mohezar, Zailani & Zainuddin, 2016; Ali, Halim, & Ahmed, 2016). The vibrancy of the halal cosmetic industry has also garnered a lot of interest and attention of many international halal beauty brands such as Amara Halal Cosmetics, Inika Organics, Talent Cosmetics, Fenty Beauty, Fresh Cosmetics, and Benefit Cosmetics to be marketed in Malaysia along with homegrown halal cosmetic labels such as Nurraysa, SimplySiti, Pretty Suci, and Orkid Cosmetics (Badarudin, 2019; Yusoff, 2018; Mustafar *et al.*, 2018; Mohezar *et al.*, 2016). The rivalry among cosmetic businesses in Malaysia can initiate pro-active regulatory infrastructure changes and encourage product innovations in the halal



cosmetic industry. Halal cosmetics has been ranked as the third-largest Islamic industry in Malaysia after Islamic banking and halal foods and beverages (Ramli, 2015).

Given above, cosmetic consumers have a more significant number of cosmetic options today than ever before; thus, it would enhance optimal decision-making for choosing halal cosmetic items. The following Section 2 reviews the literature regarding halal cosmetic awareness. Rigour research makes it possible to highlight the most significant halal cosmetic awareness determinants in Malaysia among college students.

## 2. LITERATURE REVIEW

For an individual to better understand the halal cosmetic, he/she must initially draw on the semantics of the halal word. The word halal in the Arabic word implies allowed or permissible (Ali, Salman, Yaacob, & Parveen, 2019). The halal production process must be free from pork and alcohol (Alzeer, Rieder & Hadeed, 2018; Ahmad *et. al*, 2013). In 2012, the USA Food, Drug & Cosmetic Act (2012) defined cosmetics as the items applied to the physical human body for refreshing, beautifying, and enhancing the attractiveness and modifying one's appearance. Cosmetic items cover skincare items, body bath products, hair care, and deodorants (Mohezar *et. al*, 2016; Rahim, Shafii & Shahwan, 2015).

Much of the early research also posited halal certification as the significant driver of halal cosmetic awareness (Nik Mud, Hirani, Ibrahim @ Zakaria, Kamaruddin & Hasan, 2020; Ali *et. al*, 2019; Mustafar *et. al*, 2018; Ramli, 2015; Ahmad *et. al*, 2013; C. M. Hashim & Musa, 2013). The government has empowered JAKIM as the task force to ensure the Malaysian Standard MS 2200:2008 and Halal Certification Procedure in place before the halal certification can be awarded to the cosmetic providers (Ambo, 2020; Chooi, Yoke, & Mohamad, 2020; Ali *et. al*, 2019; Mustafar *et. al*, 2018; Ahmad *et. al*, 2013). In contrast, studies on the awareness of halal cosmetics by Ali *et.al*, 2019) and Rahim *et. al* (2015) established the conclusion mix-match between low awareness and high cosmetic usage. They conjectured the halal cosmetic availability, variety of halal cosmetic products, and raw materials and ingredients were deemed crucial than halal recognition by JAKIM.

Although Malaysia Government has made much progress through halal regulations initiatives, the oft-repeated conundrum, however, halal recognition by JAKIM is yet to assure Muslim consumers, the leading driver of cosmetic in Malaysia (Teng & Wan Jusoh, 2013). A brief review of articles since the turn of 2015 highlighted the Muslims perceived halal recognition by JAKIM in Malaysia as not truly following Islam, such as Israeli cosmetic are remained available in the market, neglecting the issue of Israel oppression over Palestine Muslims. And earlier 2020, halal recognition is granted to Atomy Malaysia, the Korea based beauty and fashion business, even if the Atomy is identified actively supporting Christian missionary programmes (Mat Rawi, 2020; Ambo, 2020; Jimat, 2017).

## 3. OBJECTIVE

### 3.1 The Objective of Conducting MISFL 2020 Quiz Competition

Based on the above concern, The PMKUM as an organiser of the MISFL 2020 Quiz, limited the quiz only for Malaysian Gen-Z's college students, specifically between 18 and 23 years old. According to the President of PMKUM, Muhammad Rasydan Bin Junuh, the MISFL 2020 Quiz's result provides evidence of Islamic financial literacy among Malaysian Gen-Zs' college students. It means the carry out of quiz competition on why some students may have a relatively higher literacy than others. In line with the views of Muhammad Rasydan, Ambo & Md Sapir (2020a) found 57% of college students in Malaysia seek opportunities to gain cosmetic knowledge through the habit of experimenting with new cosmetics at an early age. This habit implies that Gen-Zers gain knowledge by learning beyond traditional classrooms (Mothersbaugh & Hawkins, 2016).

In asserting his argument, Muhammad Rasydan said Islamic social finance has usually been disregarded in universities and schools, as it appears to be the purview of the non-corporate field. Thus, many tend to concentrate more on the corporate-sound Islamic financial spectrum such as trading shares, bonds, and capital markets. Given the lack of Islamic social finance in mainstream education, it is not surprising college students have insufficient knowledge about *zakat*, *waqf*, *takaful*, and halal items. In line with President's view, in the context of halal cosmetic, despite its tremendous potentials in the halal industry, consumers are not adequately exposed to halal cosmetic. The issue of halal in cosmetic items remains a minor concern among consumers compared to halal food consumption (Chooi *et. al*, 2020; Mohezar *et. al*, 2016; Rahim *et. al*, 2015). Hence, an understanding of the halal

cosmetic awareness stage is pertinent, and the exploration further could help them prevent from using non-shariah compliance and counterfeit cosmetic products (Mohezar *et. al*, 2016).

### 3.2 The Objective of This Article

Align with MISFL 2020 Quiz Competition, this article aimed to determine the level of halal cosmetic awareness among Malaysian Gen-Zers' college students and the demographic factors that affected them. Cosmetics Business (2020) said the young generation actively participates in beauty tutorial classes, sharing their beauty tips with the public and visualising cosmetic items through their online makeup tutorials. Specifically, the study intended to investigate the relationship between college students' residence, gender, age, race, educational levels, and academic programmes. This article postulated that their demographic contributed significant direct effects on halal cosmetic awareness.

## 4. DATA AND METHOD

The result of MISFL 2020 was supplied by PMKUM, the Kelantanese Students Association in University Malaya, in December 2020 for further analysis. As an abovementioned, MISFL 2020 competition targeted 18 -23-year-old college students. This research followed Sabri, Cook, G. Gudmunson's (2012) and Ali *et. al*'s (2019) recommendations that the researcher should conduct the question Malay for local participants' better understanding. Before attempting the quiz, each participant was asked to declare their learning institution, affiliation, and National Identity Card number. Entering this quiz participation below 18 years old and above 23 years old in 2020 was deemed ineligible. Due to the COVID-19 pandemic, the quiz was shifted from physical to virtually created in the form of multiple-choice and True / False statements. The purpose of the MISFL 2020 competition was not to test participants' memory. Instead, they designed quiz questions to assess participants' awareness and their ability to capture the information. Therefore, all participants were allowed to search for the information to minimise the time of deterring cheating. The quiz was accessible for all qualified participants to make 15 November 2020 at midnight ends on 30 November 2020 at midnight. Despite the hard times, the quiz competition had obtained a total of 313 college students nationwide. Out of 313, 50 participants, or 16%, were pre-university students from Batu Kawa Secondary School, Kuching, Sarawak. The organiser was not entertaining any answers submitted after the quiz closing. The grade after completion of the quiz was automatic. After the competition, all responses were saved and stored securely in the PMKUM Google Form account. Therefore, it made this study easily accessible to the quiz data, and the researcher can transfer it to any device for analysing purposes.

### 4.1 Design of Quiz Questions

A 24-item contained quiz questions regarding general basic financial knowledge and skills, e-wallet, *zakat*, *waqf*, *takaful*, and *halal cosmetic*. As some of the quiz questions were mathematical, the organiser advised the participants to use a calculator when responding. However, out of 24 quiz questions were tested on the participants, only four halal cosmetic questions are analysed and presented for this paper. Halal cosmetic quiz questions were designed based on the research of Ambo (2020).

Initially, Ambo (2020) proposed 15 quiz questions related to halal cosmetics, and PMKUM assigned four experts to validate each draughted question. However, the PMKUM limited halal cosmetic questions to four questions. Therefore, experts had carefully assessed each question based on the criteria of relevancy, representativeness, consistency, and clarity to be quick enough to be completed by participants. Therefore, the researchers used simple sentences for each question that general participants can understand.

Likewise, the researcher's design of questions was less than ten words. In a further brainstorming session, the evaluation of each quiz question to ensure it was not too academically written until the participants felt demotivated to respond to it. Since the quiz aims to evaluate the level of awareness among college students, the revised questions incorporate general cosmetic information from social media. The question formulation for MISFL 2020 in Table 1.

**Table 1.** Halal Cosmetic Questions (Correct Response in *Italics*)

Item code	Question formulation	Response options	Reasons for selecting this question for MISFL 2020
CSMT 1	Which products need to obtain halal recognition from the Department of Islamic Development Malaysia (JAKIM)?	<i>Lip balm</i> Car House Prayer Garment	To test basic knowledge of quiz participants regarding halal recognition awarded by JAKIM.
CSMT 2	Why must the halal logo be displayed on each Shariah-compliant cosmetic product?	<i>Make-up can easily be removed by water.</i> Halal cosmetic items are cheap Halal cosmetic products are locally manufactured Can prevent Muslim women from being touched by gentlemen.	To assess whether participants know the function of halal logo.
CSMT 3	Which organisation mentioned below can authorise and monitor halal in Malaysia?	Central Bank of Malaysia TV Al-Hijrah Shopee <i>JAKIM</i>	If JAKIM is known as an Islamic body which can authorise halal in Malaysia, there will be immense opportunities for halal cosmetic to grow even in the country.
CSMT 4	Non-Muslim also can use halal cosmetic products.	<i>True</i> False Not sure	As it has often been misunderstood that halal cosmetic is a religious item that is only available to Muslims.

The mean score is grouped into three categories, as mentioned by Chen & Volpe (1998). The score of 80%-100% represents ultimately awareness of halal cosmetics, 60%-79% represents the medium level, and below 60% represents low awareness. The grading system was illustrated in Table 2.

**Table 2.** Grading System of Halal Cosmetic Awareness

Awareness Level	Range of score
High	80%-100%
Medium	60% - 79%
Low	0%-59%

## 5. FINDINGS

The demographic profiles of the quiz participants were illustrated in Table 3. More than 70% of participants are Bumiputera from Peninsular Malaysia females, 18-19, and 69.3% were Pre-University Sciences students. The revelations were in tandem with the backgrounds of respondents the prior research of Nik Mud *et. al* (2020), who were females, with 98.3% were of the age of 18-23, 80.1% of them are Bumiputera from Peninsular Malaysia and were full- time college students.

The findings reflected the composition of Malaysian college students in 2020, where females have dominated college admission. Nik Mud *et. al* (2020) also illustrated those female college students have a high level of halal cosmetic awareness that subsequently influences them to intend to buy and use local cosmetic products in the future. The demographic also showed the non-Bumiputera college students as the quiz participants. It implies that non-Bumiputera representing the non-Muslims community in Malaysia have no qualms in engaging in the relationship with halal cosmetics.

**Table 3.** Personal Backgrounds of Quiz Participants

MISFL Quiz participants' characteristics	Number of participants (N=313)	Percentages (%)
<b>Place of Residency</b>		
Urban	131	41.9
Rural	182	58.1
<b>Gender</b>		
Male	81	25.9
Female	232	74.1
<b>Age</b>		

18-19	242	77.3
20-21	46	14.7
22-23	25	8.0
<b>Races</b>		
Bumiputera		
Peninsular of Malaysia	227	72.5
Sabah	15	4.8
Sarawak	34	10.9
Chinese	30	9.6
Indian	7	2.2
<b>Educational levels</b>		
Pre-University	217	69.3
Certificate	14	4.5
Diploma	19	6.1
Bachelor Degree	63	20.1
<b>Academic programmes</b>		
Sciences	172	55.0
Islamic studies	43	13.7
Economy	47	15.0
Arts & Literature	51	16.3

The findings illustrated the overall quiz outcomes in Table 4. The overall scores were 90.2%, indicating on average, the quiz participants answered almost all questions correctly. A reason for the highest level of halal cosmetic awareness corresponds to the Gen-Zers who habitually enjoy searching for information through social media (Mccrindle, 2021). It is suspected to be caused by a high rate of exposure to halal cosmetics.

**Table 4.** Average Correct Response for All Halal Cosmetic Questions in The Quiz

Item Code Question formulation		Awareness Level		
		Low	Medium	High
		< 60%	60-79%	80%-100%
CSMT 1	Cosmetic products need to obtain halal recognition			95%
CSMT 2	Why halal logo must be displayed on cosmetic		70%	
CSMT 3	Which organisation can authorise and monitor halal in			99%
CSMT 4	Non-Muslim also can use halal cosmetic products.			97%
Average correct response for all halal cosmetic questions in the				90.2%

**Table 5.** Descriptive Statistics of The Quiz Respondents and The Halal Cosmetic Awareness Scores (%)

Quiz participants' characteristics	Mean Statistic		
	Mean Score (%)	Standard Deviation	T-Test (T) /Anova (F)
<b>Place of Residency</b>			T=1.359
Urban	89.69	0.18311	
Rural	90.52	0.15640	
<b>Gender</b>			T= 3.731
Male	87.96	0.18587	
Female	90.95	0.16082	
<b>Age</b>			F=4.060***
18-19	88.74	0.17634	
20-21	95.65	0.09581	
22-23	94.00	0.16583	
<b>Races</b>			F=21.045***
Bumiputera			
Peninsular of Malaysia	94.27	0.11290	
Sabah	86.67	0.22887	
Sarawak	85.29	0.15223	
Chinese	72.50	0.27347	
Indian	64.29	0.24398	
<b>Educational levels</b>			F=6.343***
Pre-University	88.25	0.18007	
Certificate	91.07	0.12431	
Diploma	85.53	0.20943	

Bachelor Degree	98.02	0.06812	
Academic programmes			F=0.323
Sciences	89.39	0.18537	
Islamic studies	91.28	0.15318	
Economy	90.43	0.14327	
Arts & Literature	91.67	0.13844	
Notes: *Statistically significant at 0.05 level			

The mean scores of halal cosmetic awareness among quiz participants indicated a statistically significant difference in age, race, and educational levels. Bachelor degree students at the age of 20-21 years old and Bumiputera from Malaysia Peninsular showed a significant halal cosmetic awareness score. The cosmetic and women are interchangeable. However, the result of the t-test illustrated there is no significant difference in terms of gender, suggesting men also incline to aware of halal cosmetic (Ambo & Md. Sapis, 2020b).

Place of residency is usually tightly linked to Malaysia's religiosity due to 80% of Malaysia's religious community living in rural provinces such as Perlis, Kedah, Kelantan, Terengganu, Sabah, and Sarawak (Md Sapis, 2016; Tham, 1982). Surprisingly, indifferent about the score halal cosmetic awareness in terms of residency place suggesting Gen-Z members mostly are individuals who have grown up with total exposure to the digital environment. However, they have never received formal education in Information Technology (IT). As a young generation, these quiz participants are the most accessible to the cosmetic through digital and thus would get up-to-date with the latest cosmetic products (Mohezar *et. al*, 2016). Although the rural Gen-Zers may not proximity to Klang Valley, which is known as the most urbanised province in Malaysia, the cosmetic products can still easily be reached through the online platform.

Another demographic variable, such as academic programmes, did not affect participants' level of cosmetic awareness. This result contradicts previous studies (see Ambo & Md Sapis, 2020a), which conclude that academic programmes, especially Islamic studies and non-Islamic studies, have significant differences in halal cosmetic level. Given data in Table 3, roughly 86% of the quiz participants are Muslim from non-Islamic studies. Therefore, they illustrated an indifferent awareness score between the academic programs' categories.

## CONCLUSION

This article seeks to enquire the halal cosmetic awareness among Malaysian college students. The PMKUM, an organiser of MISFL 2020, supplied data which generally held for understanding the level of Islamic social financial literacy among 18 -23-year-old college students. Findings indicate that although these college students have dependant on institutional sponsorship aid as their primary source of income during their study period, and most of them have never received formal education in Information Technology (IT), their awareness levels concerning halal cosmetics are amazingly high. The findings indicate that the high level of awareness was mainly attributed to their Gen-Z general characteristics that habitually enjoy self-searching and self-experimenting to obtain cosmetic information. These Gen-Zers actively participate in beauty tutorial classes, share their beauty tips with the public, and visualise cosmetic items through their online makeup tutorials. It reminded cosmetic providers in Malaysia that the current generation does not need personal and intimate marketing, especially when awareness about cosmetics is high. Instead, the providers are required to convince them that the halal cosmetic brand is the superior solution.

This paper was limited to fulfil MISFL 2020 to ensure the quiz can maintain a high standard of quality across being launched nationwide. It is merely to assist college students with similar exceptional experiences in understanding Islamic social financial literacy. As an exploratory trial, this study was not expecting to discuss halal cosmetic in-depth. The findings as well may not translate to college students from other countries.

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## Interview

Muhammad Rasydan Bin Junuh, President of Persatuan Mahasiswa Kelantan Universiti Malaya (PMKUM), in interview session with him on 8 December 2020.



## Bibliometric Analysis of Islamic Finance Literature

### *İslami Finans Literatürünün Bibliyometrik Analizi*

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#### **ABSTRACT**

*Islamic finance, whose modern applications date back to the 60s, has been brought to the agenda with the discussions of being an alternative to the capitalist system with the 2008 global financial crisis. The interest of policy makers with practitioners and the academic community on the subject has increased day by day. The approaches, methods and tools of Islamic finance in dealing with crises and creating a stable economic structure are examined. With this study, it is aimed to conduct a bibliometric analysis of the publications that were published between 2008-2020, which is the post-crisis period and can be accessed through Web of Science, which is considered a qualified database. As a result of the analysis made by the Vosviewer program, the publications produced by individuals or institutions in a specific period and a specific region and the relationships between these publications are revealed numerically and visually. According to results; Malaysia is the country with the highest number of publication and citation. America follows it in the second place. International Islamic University Malaysia is at the forefront with 75 article on Islamic finance, 67 articles on Islamic banking and 15 articles on Islamic economics. Other Malay universities also take the lead. Istanbul Sabahattin Zaim University is also in the top ten. the journal with the most publications in the literature is the International Journal Of Islamic and Middle Eastern Finance and Management. Borsa Istanbul Review and Turkish Journal Of Islamic Economics are in the top ten with the average number of the document. Thorsten Beck, Aslı Demirgüç-Kunt and Ouarda Merrouche are the authors who received over 400 citations.*

#### **ÖZET**

**Anahtar Kelimeler:**

*İslami Finans, İslam*

*Ekonomisi,*

*Bibliyometrik Analiz,*

*Vosviewer Program*

*Modern uygulamaları 60'lı yıllara dayanan İslami finans, 2008 küresel finans kriziyle birlikte kapitalist sisteme alternatif olma tartışmalarıyla gündeme gelmiştir. Politika yapıcılarının, uygulamacıların ve akademisyenlerin konuya olan ilgisi hergeçen gün artış göstermektedir. İslami finansa yönelik yaklaşımlar, yöntemler ve araçlar İslami finansın krizlerle başa çıkma ve istikrarlı bir ekonomik yapı oluşturmadaki yerini incelemektedir. Bu çalışma ile kriz sonrası dönem olan 2008-2020 yılları arasında yayınlanan ve nitelikli bir veri tabanı olarak kabul edilen Web of Science üzerinden erişilebilen yayınların bibliyometrik analizinin yapılması amaçlanmaktadır. Vosviewer programı ile yapılan analizler sonucunda kişi veya kurumlar tarafından belirli bir dönemde ve belirli bir bölgede üretilen yayınlar ve bu yayınlar arasındaki ilişkiler sayısal ve görsel olarak ortaya çıkarılmaktadır. Analiz sonuçlarına göre Malezya en fazla yayın ve atıf alan ülkedir. Amerika ise ikinci sırada onu takip etmektedir. International Islamic University Malaysia, İslami finans üzerine 75 makale, İslami bankacılık üzerine 67 makale ve İslam ekonomisi üzerine 15 makale ile kurumsal bazda ön plana çıkmaktadır. Diğer Malay üniversiteleri de aynı şekilde alan yazına öncülük etmektedir. İstanbul Sabahattin Zaim Üniversitesi de ilk on içinde yer almaktadır. Literatürde en fazla yayını olan dergi International Journal of Islamic and Middle Eastern Finance and Management'tır. Borsa İstanbul Dergisi ve Türk İslam Ekonomisi Dergisi, ortalama yayın sayısı ile ilk on içinde yer almaktadır. Thorsten Beck, Aslı Demirgüç-Kunt ve Ouarda Merrouche 400'ün üzerinde atıf alan yazarlardır.*

## 1. INTRODUCTION

Islamic finance, whose modern applications date back to the 60s, has become an increasingly popular subject. The first practice in the field is the Tabaj Haji Fund, which was established in 1959 to finance the pilgrimage savings of Malaysian Muslims. The first experiment in which various types of the financing were used is Mit Ghamr, which was established in Egypt between 1963-1967 (Çizakça: 2014: 156). Although it was a good start, this practice could not be continued for political reasons. Interest-free banking practices started in many countries between 1975-1990 and investments increased.

The International Islamic Economics Conference held in Mecca in 1976 brought together Islamic scholars and economists for the first time. Thus, a significant literature in the field of Islamic economics had been created. Later, many universities started to establish Islamic economics departments separately (IRTI: 1993: 19). After the initial theory development studies, the perspective is narrowed over time and there was an increase in publications focused on banks, which are the driving forces of the conventional economic structure. Due to its stable and robust structure, Islamic banking has been the subject of many studies not only in Islamic countries but also in Europe and America with the 2008 crisis. The existence of standard regulatory organizations and institutions conducting theoretical and applied research, established to ensure the sustainability of the growth in the sector and the unity of practice, also supported the strengthening of the system.

This study is designed to present an international perspective to researchers who will study on Islamic finance in the field of social sciences. The aim of this study is to reveal the articles conducted in the post-crisis period by which authors in which journals and the performance level of the country and institution. The motivation of this study is to evaluate the development and change of the literature in the relevant period and to reveal the deficiencies. The development of the literature is an indicator that gives us a clue about sectoral development.

### 1. Bibliometric Analysis

Bibliometry is defined as "the numerical analysis of the publications produced by individuals or institutions in a specific area and in a specific region and the relations between these publications" (TUBİTAK, 2015) or "the use of mathematical and statistical methods to measure and analyze the bibliographic information of the publications" (Padros-Cuxart and others, 2016: 44). It is seen that the method is increasingly used in the world of science. In particular, universities use bibliometric data when reporting to public authorities, managing project applications, accrediting doctoral programs, analyzing the scientific output, determining research policies and strategic goals (Padros-Cuxart and others, 2016: 44). The periodic bibliometric analyzes made by the researchers on their own discipline and sub-speciality areas are important in terms of following the developments. In addition, the data of existing studies can provide effectiveness in the planning and financing of future research projects.

In an age where knowledge takes on a completely new and more important role, information, which is necessary for users but needs to be processed and analyzed, has gained value rather than information that is clearly visible on paper or in databases (Ball and Tunger, 2006: 561). The bibliometric method provides an advantage in objectivity and measurability and helps to avoid subjective bias. This type of information enables researchers to establish links between authors or articles (Muritala and others, 2020: 4).

The method provides an overview of the academic literature and is used to identify publications, authors, journals, institutions and countries that have had an impact. If the goal is to analyze scientific productivity in a research area, it must be ensured that the subject is well represented in the database on which the bibliographic search is based. At this point, it is seen that Web of Science (WoS) and Scopus, as reliable sources of citation data, are extensively used to carry out bibliometric studies.

## 2. LITERATURE

It is stated that the first bibliometric analysis made in the Turkish literature was the study conducted by Ahmet Kemal Özinönü in 1970 on basic sciences (Al, 2008: 9). When looking at the bibliometric studies in the field of accounting and finance, it is seen that it does not have a very old past. Relevant literature is presented below in a table form in order to express concisely and clearly.

**Table 1.** Bibliometric Analysis Performed in the Accounting and Finance Discipline

Name of Article	Year	Range of Analysis Years	Writers	Result
Bibliometric Analysis of Atatürk University Journal of Economic and Administrative Sciences	2013	2005-2012	Coşkun Polat Mukaddes Sağlam Tuba Sarı	It has been put forward that; - The most contributing academic group is assistant professors and research assistants, -A significant portion of the mass that publishes is not a member of Ataturk University, -so that the journal is a national journal beyond a faculty journal.
Bibliometric Analysis of Articles Published in Journal of Accounting and Finance	2014	2005-2013	Mustafa Hotamışlı Işıl Erem	The studies mainly focused on financial performance, public economy and financial markets, and empirical research approaches were preferred.
Bibliometric Analysis of Articles Published in the Journal of Accounting and Financial History Research	2016	2011-2016	Sudi Apak Mikail Erol Seçil Öztürk	The average number of authors per article is 1.73. theoretical work rate is 75%, empirical work is 25%. 29 of the articles were prepared by foreign and 71 by Turkish authors.
Bibliometric Analysis of Maliye Journal: 2007-2016 Period	2017	2007-2016	Furkan Beşel Fatih Yardımcıoğlu	The most striking result of the study is the finding that empirical studies in the field of finance have increased in recent years.
Bibliometric Analysis of Articles Published in the Journal of Accounting and Tax Applications	2018	2008-2017	Cevdet Yiğit Özbek Ahmet Cemkut Badem	As a result of the analysis, it was determined that the importance of the journal is gradually increasing.
Bibliometric Analysis of the Articles Published in Different Academic Journals about Accounting Areas Between the 2014-2016 Academic Year in Turkey	2018	2014-2016	Meral Gündüz	As a result of the study, Accounting Science World was found as the journal with the highest number of publications.
Investigation of Studies in Auditing and Forensic Accounting Using Bibliometric Analysis Technique	2018	1960-2018	Seyhan Öztürk Cihan Yılmaz	It has been found that more articles have been written in this field over the years.
Analysis of Theses Published in Islamic Banking Areas in Turkey	2018	1986-2017	Mustafa Tevfik Kartal	While a horizontal tendency is observed in doctoral dissertations on interest-free banking, the number of master's theses tends to increase with fluctuations.
Bibliometric Analysis of Theses Done in the Field of Islamic Economics: The Case of Malaysia International Islamic University	2019	2008-2019	Muhammet Yurtseven	It has been found that the theses in the field of Islamic banking and finance made at IIUM are parallel to modern finance topics.
Investigation of Thesis on Accounting Standards Made in Turkey	2019	1991-2018	Neşe Çoban Çelikdemir	As a result of the examination of 555 theses written in the relevant period, the most studied subjects are SME IFRS/TFRS, stocks, accounting in construction businesses, tangible fixed assets. Also there are 5 standards that have no postgraduate thesis subject.
A Retrospective of Islamic Finance Literature: A Bibliometric Analysis on Past and Future Insights	2020	1990-2020	Sadık Karaoğlu	It is found that there has been a rapid increase in studies on Islamic finance after 2005.

It is seen that bibliometry has been used as an analysis method in the field of Islamic finance since 2018. Articles analysis has also been added to the studies that started with the analysis of graduate theses. Thus, it can be said that a general framework has been drawn regarding the recent developments in the literature.

## 2. METHOD

In the study, the document analysis method is used for data collection and the data is obtained from the Web of Science (WOS). Document analysis is a systematic procedure for reviewing or evaluating printed and / or electronic documents. Like other analytical methods in qualitative research, document analysis also requires the analysis and interpretation of data to reveal meaning and to enhance empirical knowledge (Bowen, 2009: 27). The data were searched in the WOS database by using the keywords "Islamic finance", "Islamic economics" and "Islamic banking" separately and covering specialized years (2008-2021). In addition, only the articles were analyzed by applying the article filter among these results. All analyzes were carried out by selecting at least 1 document and 1 citation values in the program.

**Table 2.** Language of Studies

Keyword	English	Turkish	Malay	Russian	Other
Islamic finance	1102	7	5	11	7
Islamic economics	189	5	1	1	5
Islamic banking	1186	5	6	8	8
Source: Web of Science Database					

In the searches made specifically for Web of Science, the dominant language of the publication is English. Russian, Turkish and Malay are the other languages of articles. The number of publications on the subject since the 70s is presented in Table 2. It is seen that the main increase was experienced with the 2008 crisis.

**Table 3.** Number of Publications on Islamic Finance

Web of Science (article)	Keyword: "Islamic economics"	Keyword: "Islamic banking"	Keyword: "Islamic finance"	Number of Total Publication	Increase Rate of Publication Number
1975-1997	12	10	4	26	-
1998-2003	1	11	3	15	-
2004-2009	11	38	28	77	413%
2010-2015	50	312	314	676	777%
2016-2021	119	831	783	1733	156%
Source: Web of Science Database					

The results obtained from the WoS were analyzed with Vosviewer, a computational program. Vosviewer significantly reduces subjectivity biases regarding research by embracing authors' publications across a wide range of perspectives and disciplines.

Data were analyzed as author, institution, country, source and co-occurrence keywords. While making these analyzes; 863 articles were used for "Islamic finance", 131 articles for "Islamic economics" and 928 articles for "Islamic banking". The most important constraint of the study is that the articles were accessed through the Web of Science, which is only a single database. Although it is a database that is accepted to be comprehensive in the literature, scientific publications that are not scanned here are outside the scope of the research.

## 3. FINDINGS

### (i) Top Streaming Countries

Data was analyzed at the program according to citation. Among the article studies on Islamic finance, Islamic banking and Islamic economy, the top 10 countries producing the most publications are shown in Table 4.

Malaysia is the country with the highest number of publication and citation. America follows it in the second place.

**Table 4.** Top Streaming Countries

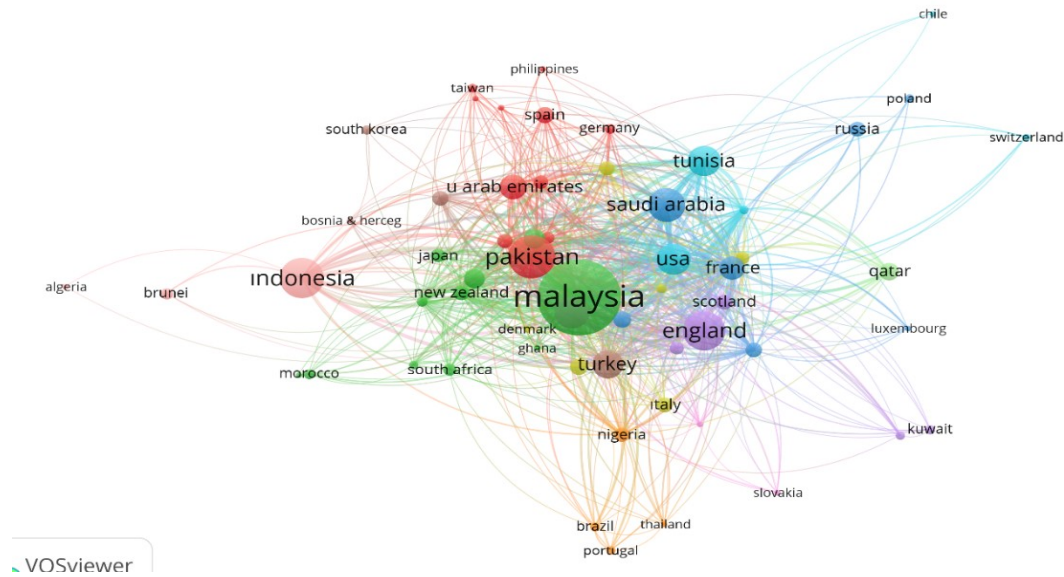
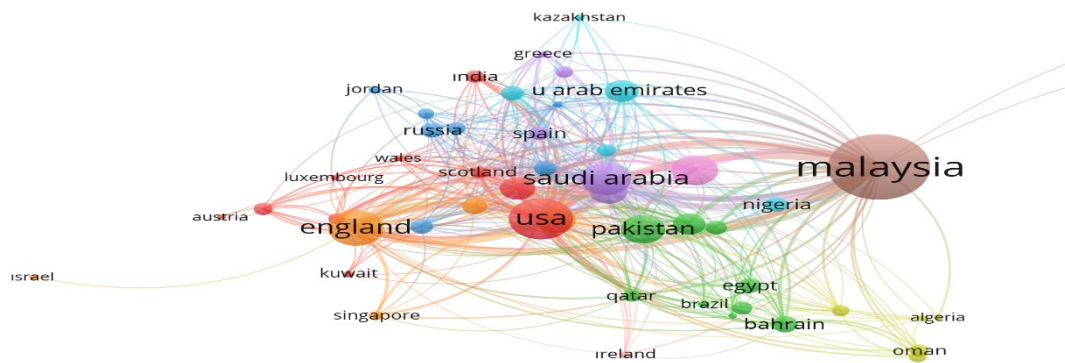
			Keyword: “Islamic finance”			Keyword: “Islamic economics”			Keyword: “Islamic banking”		
Number of countries			55 (51 items-10clusters)			26 (14items-6 clusters)			67 (60 items-11 clusters)		
Islamic Finance			Islamic Banking			Islamic Economics					
Country	Docume nt N.	Citation N.	Country	Docume nt N.	Citation N.	Country	Docume nt N.	Citation N.	Country	Docume nt N.	Citation N.
Malaysia	289	1116	Malaysia	315	1400	Malaysia	36	51			
USA	113	896	USA	54	1339	Saudi Arabia	14	27			
Saudi Arabia	71	562	England	84	785	Indonesia	21	21			
England	86	466	France	30	541	USA	14	16			
Tunisia	41	391	Pakistan	101	524	Germany	3	13			
France	35	387	Netherlands	4	524	Pakistan	8	12			
Australia	45	291	New Zealand	13	420	Scotland	1	11			
Netherlands	14	190	Australia	56	372	Turkey	17	8			
Scotland	9	190	Singapore	6	313	Australia	4	7			
Belgium	8	160	Saudi Arabia	63	287	France	3	6			

Turkey is also among the top ten countries publishing the most publications in the Islamic economics literature. The striking point at the table is the intense interest of Western countries on the topic along with Islamic countries.

In Figures 1.2 and 3 where the bibliometric network analysis is shown, it is possible to see the connections between countries with the display of common colors. The size of the circle indicates the excess number of publications belonging to the countries. Circle colors denote the existence of joint work between countries. The lines between the circles show which countries have relations with others.

**Figure 1:** Country Network Map (Islamic Economics)



**Figure 2. Country Network Map (Islamic Banking)****Figure 3. Country Network Map (Islamic Finance)**

When the findings are evaluated in terms of linkage strength, the countries with the highest power for all three keywords are Malaysia, Indonesia, Pakistan, USA, England and Saudi Arabia. Relationship ties between countries on the map are very intense and complex. The countries that work most intensely on the subject are clustered at points close to each other.

#### (ii) Top Publishing Institutions

Data was analyzed at the program according to citation. Among the article studies on Islamic finance, Islamic banking and Islamic economy, the top 10 institutions that produce the most publications are shown in Table 5. International Islamic University Malaysia is at the forefront with 75 article on Islamic finance, 67 articles on Islamic banking and 15 articles on Islamic economics. Other Malay universities also take the lead. Istanbul Sabahattin Zaim University is also in the top ten. In addition, the University of New Orleans and Durham University draw attention to their western origin in the table.

			Keyword: “Islamic finance”	Keyword: “Islamic economics”	Keyword: “Islamic banking”			
	Number of institutions		544 (396 items-23 clusters)	77 (13 items-7 clusters)	610 (531 items-28 clusters)			
Islamic Finance			Islamic Banking			Islamic Economics		
Instution	Docume nt N.	Citation N.	Instution	Docume nt N.	Citation N.	Instution	Docume nt N.	Citati on N.
Int Islamic Univ Malaya	75	219	Int Islamic Univ Malaysia	67	211	Int Islamic Univ Malaysia	15	17
Univ New Orleans	30	168	Univ Kebangsaan Malaysia	33	213	Istanbul Sabahattin Zaim Univ	8	4
Univ Malaya	24	96	Univ Malaya	33	209	Trisakti Univ	7	7
Istanbul Sabahattin Zaim Univ	21	53	Univ Utara Malaysia	21	138	Univ Malaya	7	7
IIUM	19	49	Univ Sains Malaysia	16	32	Islamic Dev Bank	5	19
Int Ctr Educ Islamic Finance	19	20	Univ Putra Malaysia	16	98	IIUM	3	4
IIUM	18	13	Univ Durham	15	183	Univ Airlangga	3	2
Univ Kebangsaan Malaysia	17	20	IIUM	15	36	Alfaisal Univ	3	5
Univ Durham	14	90	King Abdulaziz Univ	14	76	Univ Toronto	3	3
King Abdulaziz Univ	12	131	Univ Teknol Mara	14	80	Int CTR Educ Islamic Finance INCEEIF	2	2

**Figure 4.** Top Publishing Institutions Network (Islamic Finance)

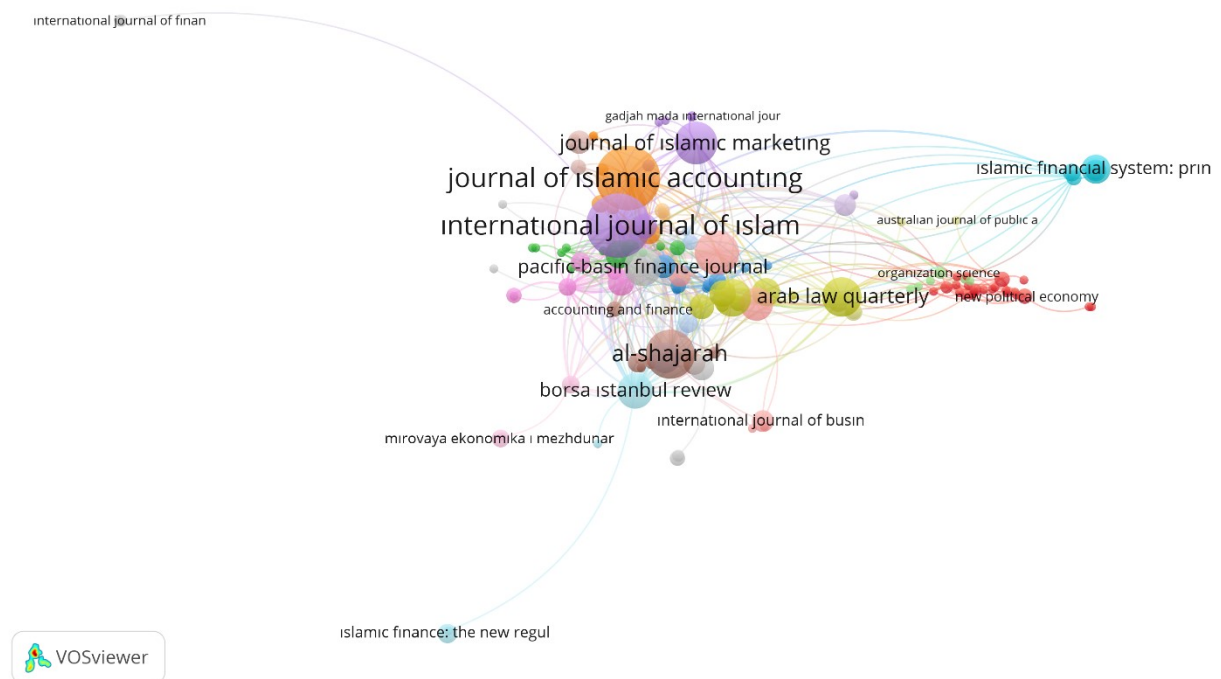


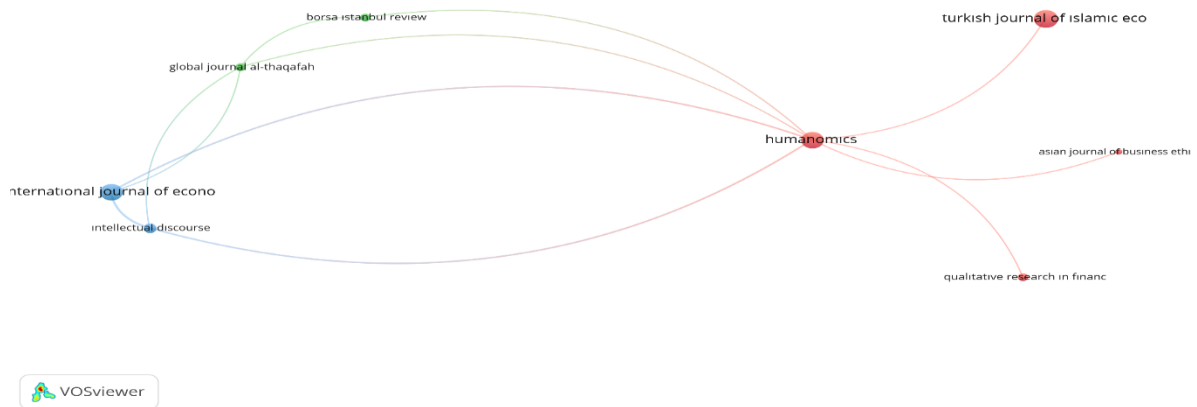
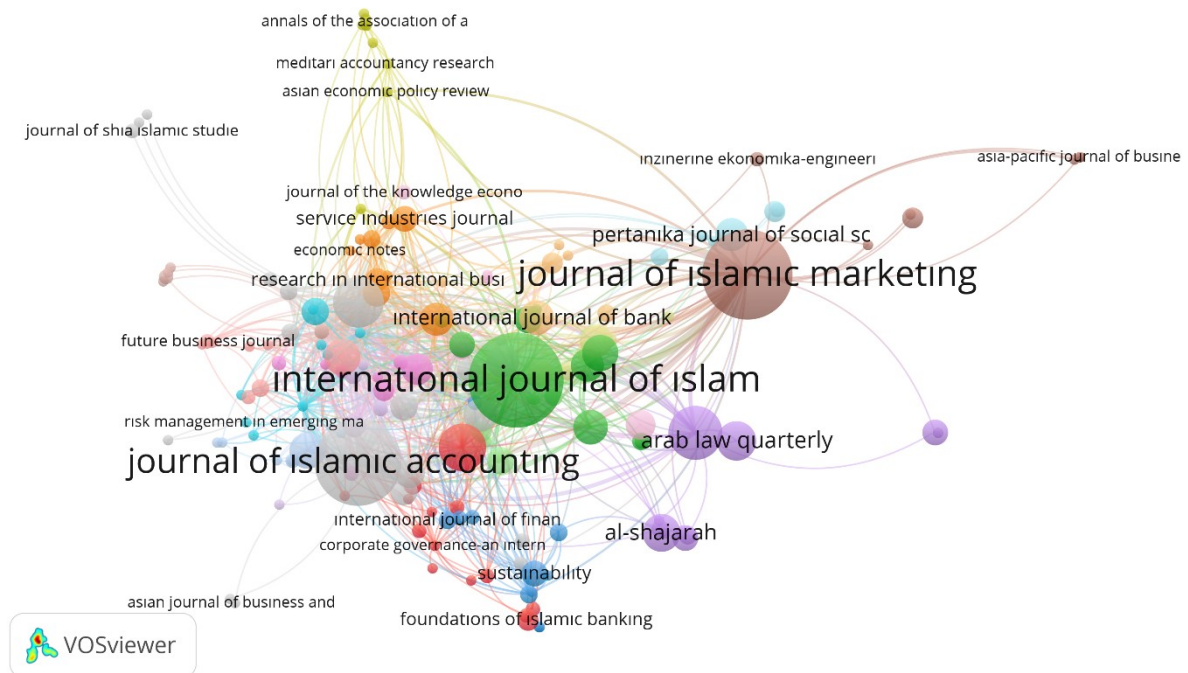


Journal Of Islamic Accounting And Business Research	52	125	Journal Of Islamic Marketing	73	321	Humanomics	9	30
Al Shajarah	31	39	Journal Of Islamic Accounting And Business Research	67	151	International Journal Of Economics Management And Accounting	9	9
Isra International Journal Of Islamic Finance	25	36	Isra International Journal Of Islamic Finance	26	46	International Journal Of Islamic And Middle Eastern Finance And Management	5	9
Journal Of Islamic Marketing	23	57	Pacific Basin Finance Journal	23	632	Isra International Journal Of Islamic Finance	5	8
Arab Law Quarterly	20	22	Turkish Journal Of Islamic Economics	20	12	What is Wrong with Islamic Economics?	5	3
Pacific Basin Finance Journal	18	332	Arab Law Quarterly	14	15	Journal Of Islamic Marketing	4	3
Intellectual Discourse	18	38	Al Shajarah	13	18	Intellectual Discourse	3	4
Borsa İstanbul Review	16	121	Economic Modelling	12	188	Journal Of Islamic Accounting And Business Research	3	3
Qualitative Research In Financial Markets	14	22	Etikonomi	12	5	Tarih Kültür ve Sanat Araştırmaları Dergisi	3	1

In Figures 7.8 and 9 where the network analysis is shown, it is possible to see the connections between sources with the display of common colors. Journal Of Islamic Accounting And Business Research, Journal Of Islamic Marketing, International Journal Of Islamic And Middle Eastern Finance And Management, Turkish Journal Of Islamic Economics and Humanomics stands out. The common point in the graphs is the excess number of clusters.

**Figure 6.** Sources Network Map (Islamic Finance)



**Figure 7.** Sources Network Map (Islamic Economics)**Figure 8.** Sources Network Map (Islamic Banking)

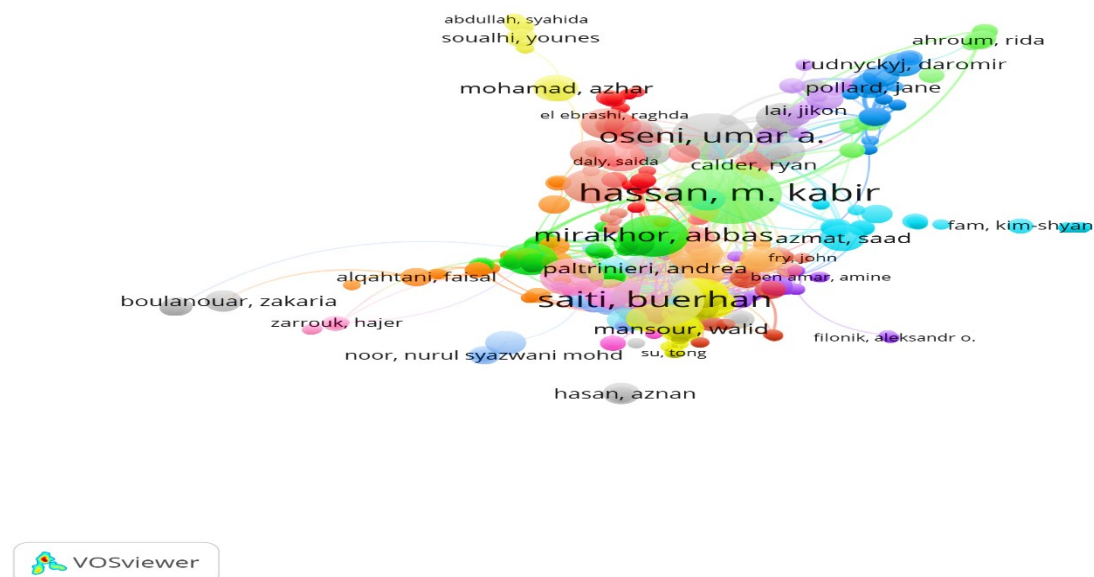
#### (iv) Most Referred Authors

Data was analyzed at the program according to citation. The most frequently referred authors are shown in Table 7. Thorsten Beck has the most high citations, citing a total of 148 times on the subject of Islamic finance and banking. Aslı Demirgüç-Kunt and Ouarda Merrouche are the authors who received over 400 citations with a single publication. It is seen that Necati Aydın from Turkey is also in the top ten in the field of Islamic economics.

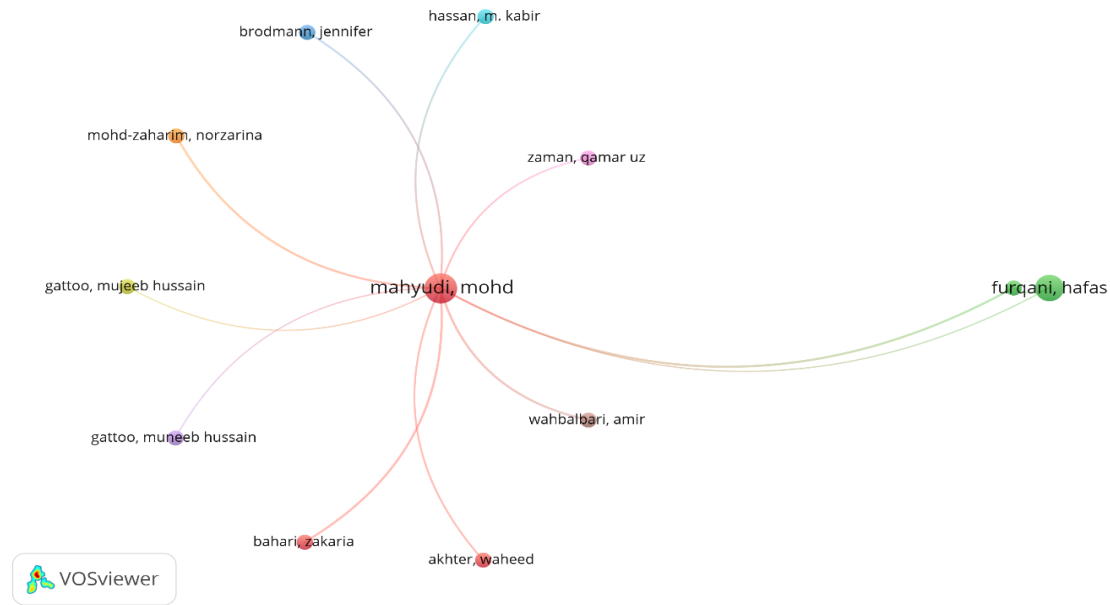
**Table 7.** Most Referred Authors

			Keyword: “Islamic finance”			Keyword: “Islamic economics”			Keyword: “Islamic banking”		
Number of authors			805 (570 items-26 clusters)			102 (12 items-9 clusters)			1130 (956 items-28 clusters)		
Islamic finance			Islamic banking			Islamic economics					
Writer	Docu ment N.	Citation N.	Writer	Docume nt N.	Citation N.	Writer	Docume nt N.	Citation N.			
Syed Aun R. Rizvi	6	229	Muhamed Zulkhibri	1	14	Thorsten Beck	2	474			
Ginanjar Dewandaru	5	205	Mohd Mahyudi	4	11	Aslı Demirgüç-Kunt	1	472			
Mansur Masih	7	194	Rana Alsoufi	1	11	Ouarda Merrouche	1	472			
M.Kabir Hassan	32	168	Rania Kamla	1	11	Beng Soon Chong	1	282			
Raphie Hayat	3	160	Wazir Jahan Kariö	1	10	Ming-Hua Liu	1	282			
Laurent Weill	9	153	Hafas Furqani	3	8	Pejman Abedifar	4	262			
Roman Kraeussl	1	131	Adam Abdullah	1	6	Amine Tarazi	3	259			
Shawkat Hammoudeh	3	129	Nafis Alam	2	6	Martin Cihak	1	255			
Noomen Ajmi	3	127	Necati Aydın	3	6	Heiko Hesse	1	255			
Rumi Masih	3	125	Masudul Alam Choudhury	6	5	Philip Molyneux	2	250			

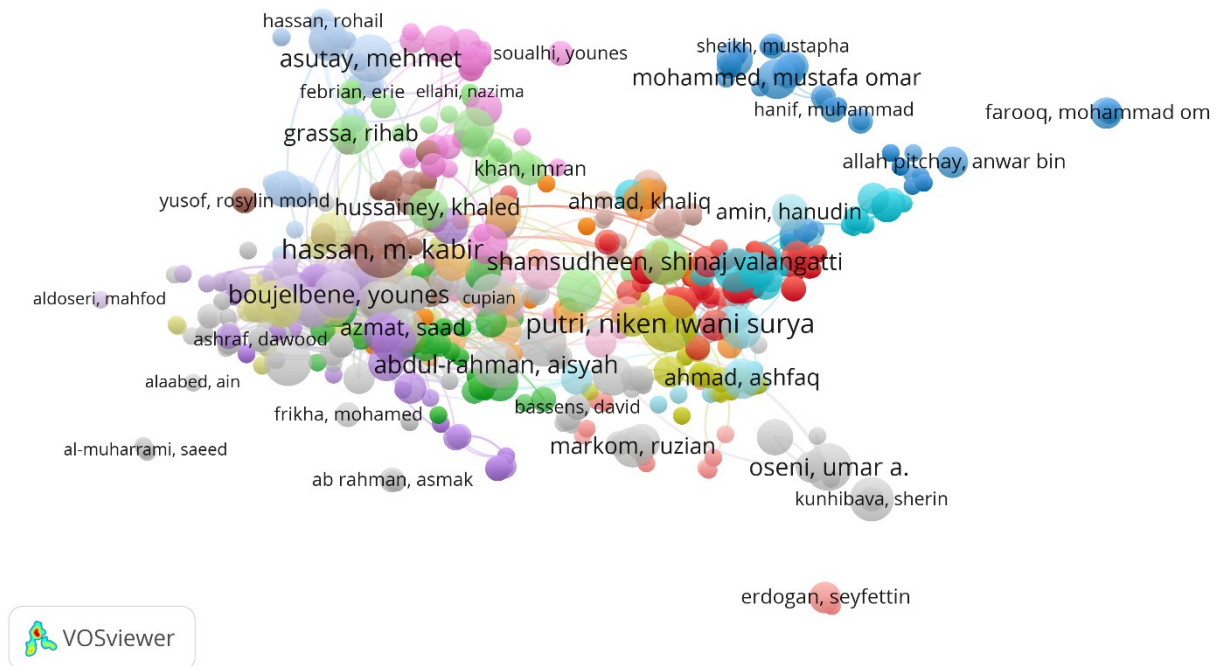
Figures 10, 11 ve 12 shows the authors' network maps. The size of the circles and the font size of the label indicate the size of the number of occurrences. Colors represent clusters (how many classes they are divided into). Kabir Hassan, Buerhan Saiti and Niken Surya Putri have the highest linkage power.

**Figure 9.** Authors Network Map (Islamic Finance)

**Figure 10.** Authors Network Map (Islamic Economics)



**Figure 11.** Authors Network Map (Islamic Banking)



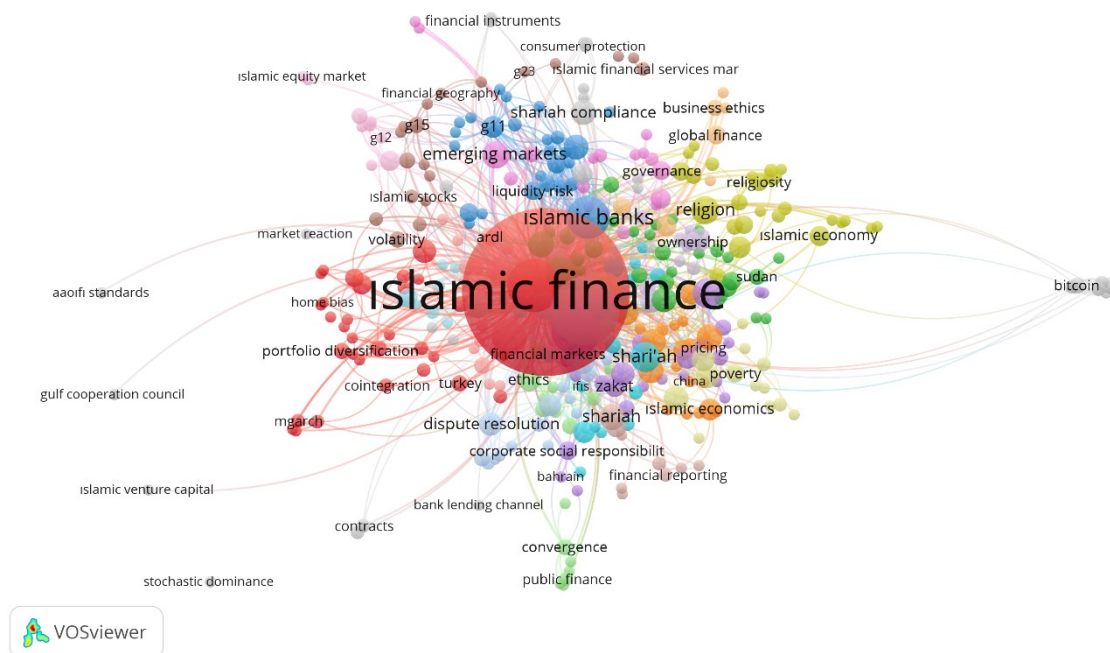
(v) Co-occurrence keywords

The keyword analysis was conducted in order to evaluate the subject contents of scientific publications in the field. In this analysis, 2 was chosen as the minimum number of occurrences. It is seen that the concepts of Islamic finance, Islamic economy and Islamic banking are frequently used together. Islam, Islamic law and sharia concepts that draw the boundaries of the field are also frequently used. Malaysia, the country with the biggest market share and the highest number of publications and citations, is among the frequently used keywords.

**Table 8.** Keywords

				Keyword: “Islamic finance”	Keyword: “Islamic economics”	Keyword: “Islamic banking”		
			Number of co-occuration keywords	377 (372 items- 31 clusters)	51 (46 items- 8 clusters)	444 (443 items- 26 clusters)		
Islamic finance			Islamic banking			Islamic economics		
Keyword	Occurrence N.	Linkage Strenght	Keyword	Occurrence N.	Linkage Strenght	Keyword	Occurrence N.	Linkage Strenght
Islamic banking	68	152	Islamic banks	137	322	Islamic finance	13	20
sukuk	41	120	Islamic finance	78	173	Islamic banking	6	5
Malaysia	35	92	malaysia	63	167	homo Islamicus	4	10
Islamic banks	27	68	corporate governance	32	82	ethics	4	7
takaful	18	47	Islamic bank	29	55	Islamic economy	4	4
Islamic law	18	43	Pakistan	25	72	Islamic banks	4	3
economic growth	15	35	conventional banking	24	70	shariah	3	8
shariah	13	37	service quality	22	68	Islam	3	7
Islam	13	34	customer satisfaction	21	73	riba	3	6

The most studied terms with the concept of Islamic finance, in other words, the map of research trends, are presented in Figure 13,14 ve 15. The circle size shows the excess usage of the keywords, the circle colors indicate which keywords are used together, and the lines between the circles indicate that they are related.

**Figure 12.** Keyword Network Map (Islamic Finance)





the presence of publications that focus heavily on the subject in the Middle East, Turkey and other countries draws attention. Regardless of the number of publications, the number of citations is a criterion that determines the originality, position and place of an academic study in the literature. Analysis results show that Western writers were quite successful in this dimension. The density of the network map prepared for the "Islamic economy" is less than the others due to the lower number of publications. Another point that draws attention in the results is that the concepts of Islamic economy and Islamic finance are used extensively in the titles of the journals.

This study contributes to the literature in terms of basing the selected analyzes on more than one keyword and the database from which the data are obtained. This study is limited in terms of the used keywords and referenced database. For the further studies, analyzes on the basic methods and instruments of Islamic finance can be made. In addition, the scope of analysis can be expanded over other databases such as Scopus. It is also possible to add books, conference papers and other publications to the scope of the analysis. In addition, choosing more specific words such as "shariah", "sukuk", "takaful", "risk management" and "islamic stocks" instead of general keywords while searching is important in terms of following the development of the literature.

The Islamic finance sector develops on three pillars: banking, insurance and capital markets. Islamic financial assets reached \$ 2.88 trillion in 2020 and are expected to rise to \$ 3.69 trillion by 2024 (S&P, 2020: 9). Considering that the total global wealth increased by 36.3 trillion dollars to 399.2 dollars in 2019, it is seen that the share of Islamic finance in the finance sector is 0.7% (CreditSuisse, 2020). The Middle East, Africa and South Asia (MEASA) region remains a stable player. Turkey, in response to declining asset values, stands out with its success in the sukuk market (S&P, 2020: 9). Turkey, along with Saudi Arabia, located in the 25 largest global economies are member states of the Organization of Islamic Development. In addition, Turkey has important development potential. The Istanbul Financial Center project is also the biggest step taken in this regard (SalaamGateway: 2020).

The support given by the state authorities to the Islamic finance field in the last 10 years is known. The subject is included in the development plans, public participation banks have been established, a participation index has been created in Borsa Istanbul, the regulations regarding the lease certificate and crowdfunding activities have been completed. Finally, with the Participation Finance Department established within the Presidency, a corporate department was established for the field. It is possible to eliminate the lack of trained personnel and trust problems with undergraduate and graduate programs and academic studies in this field. Rewarding successful institutions and names will be a catalyst for the desired development. Periodic bibliometric studies on Islamic finance literature will present the portrait of the country as an audit mechanism and will be a guide for the steps to be taken.

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# The Impact of Environmental Taxes on Carbon Dioxide Emissions in Turkey

## Türkiye’de Çevre Vergilerinin Karbondioksit Emisyonu Üzerindeki Etkisi

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### Keywords:

Environmental  
Taxes, CO<sub>2</sub>  
Emissions, Turkey

### ABSTRACT

Among the causes of environmental pollution, which has become a global problem, are the increase in consumption of fossil-based energy sources due to industrialization and technological development, population growth and urbanization. Countries use different methods of struggle at national and international level in solving environmental problems. The most effective way to be implemented within the scope of this struggle is environmental taxes. One of the taxes used to reduce greenhouse gas emissions is carbon taxes, which is a type of environmental tax. Most of the applications for these taxes in the world are seen in EU countries. Although carbon taxes have not been placed on a legal basis in Turkey, there are tax practices under the name of environmental taxes. In this context, the first tax applied directly within the scope of combating environmental pollution within the Turkish Tax System is the Environmental Cleaning Tax. The bag fee can also be evaluated within this scope. In this study, the effect of environmental taxes on CO<sub>2</sub> emissions for the period of 1994-2015 in Turkey was examined. For this purpose, the long-term relationship between the series included in the analysis was investigated with the Johansen Cointegration test. Long-term coefficient estimates were made using FMOLS, DOLS and CCR Models. In the study, it was concluded that the series were co-integrated and that the environmental tax reduced CO<sub>2</sub> emissions in the long run.

### Anahtar Kelimeler:

Çevre Vergileri,  
CO<sub>2</sub> Emisyonu,  
Türkiye

### ÖZET

Küresel bir sorun haline gelen çevre kirliliğinin nedenleri arasında sanayileşme ve teknolojik gelişmeye bağlı olarak fosil bazlı enerji kaynaklarına yönelik tüketimin artması, nüfusun artması ve kentleşme gibi olgular yer almaktadır. Ülkeler çevre sorunlarının çözümünde ulusal ve uluslararası düzeyde farklı mücadele yöntemleri uygulamaktadır. Bu mücadele kapsamında uygulanabilecek en etkin yol ise çevre vergileridir. Sera gazı emisyonunu azaltmak amacıyla kullanılan vergilerden biri de çevre vergilerinin bir türü olan karbon vergileridir. Dünyada bu vergilere yönelik uygulamaların çoğu AB ülkelerinde görülmektedir. Türkiye’de karbon vergileri yasal bir zemine oturtulmamış olsa da çevre vergileri adı altında vergi uygulamalarına rastlanmaktadır. Bu çerçevede Türk Vergi Sistemi içerisinde doğrudan çevre kirliliği ile mücadele kapsamında uygulanan ilk vergi Çevre Temizlik Vergisi’dir. Poşet ücreti de bu kapsamda değerlendirilebilir. Bu çalışmada Türkiye’de 1994-2015 dönemi için çevre vergilerinin CO<sub>2</sub> emisyonu üzerindeki etkisi incelenmiştir. Bu amaçla, çalışmada analize dâhil edilen seriler arasındaki uzun dönemli ilişki Johansen Eşbütünleşme testi ile araştırılmıştır. Uzun dönemli katsayı tahminleri ise FMOLS, DOLS ve CCR Modelleri kullanılarak yapılmıştır. Çalışmada serilerin eş bütünleşik olduğu ve uzun dönemde çevre vergisinin CO<sub>2</sub> emisyonunu azalttığı sonucuna ulaşılmıştır.

## 1. INTRODUCTION

It is not possible to consider the activities carried out by businesses separately from the environment. Many environmental problems caused by human-induced factors threaten the future of all living things at the global level. Global warming is the leading factor that causes the deterioration of the ecological balance. Climate changes are another adverse effect caused by global warming (Reeves and Lenoir, 2006: 16). Discussions on carbon taxes emerged as a result of the assertion that greenhouse gases were effective as the cause of climate change and global warming in the 1990s (Karakaya and Özçağ, 2001: 2) and that the most important factor affecting this formation was carbon dioxide gas (Vural, 2006: 159).

CO<sub>2</sub> emissions, which are accepted as one of the important sources of global warming, are produced especially by coal, oil, gas etc. It has increased dramatically due to reasons such as excessive consumption of fossil fuels, widespread use in electricity generation and transportation activities (Alam, 2014: 36). In this direction, the most common and effective way of protecting the environment is taxation (Groosman, 1999: 539).

In this study, it is aimed to investigate the effect of environmental taxes on CO<sub>2</sub> in Turkey for the period 1994-2015. Although there are theoretical studies in the literature in the case of Turkey, no empirical studies were found as a result of the literature review. Most empirical studies were carried out in the EU example. The study is important in terms of contributing to this gap in the literature. The study consists of five parts. After the introduction section, the second part focused on the Kyoto Protocol and environmental taxes, which were created to reduce greenhouse gas emissions on a world scale. In the third part of the study, environmental taxes applied in Turkey were evaluated. In the fourth chapter, a literature review on the subject is included. In the fifth part, model, data and analysis results are given. The work was completed with the resulting section.

## 2. KYOTO PROTOCOL AND ENVIRONMENTAL TAXES

In recent years, there has been a worldwide awareness as a result of all these negative consequences such as climate changes in the world, excessive temperatures, melting glaciers, storms and natural vegetation. Countries have taken action together to take urgent action. One of the most important steps taken in reducing emissions leading to climate change in this process is the "Kyoto Protocol" (Norregaard, and Reppel-Khll, 2000).

The Kyoto Protocol, adopted in 1997 to reduce the use of greenhouse gases, came into force in 2005. The terms of the agreement were established in 1992. The Kyoto Protocol has not been signed by many countries as it will lead to energy loss. The United States is one of the leading countries that did not sign the protocol. Other countries that have not signed the protocol are Angola, Afghanistan, Central African Republic, Ivory Coast, Chad, Somalia, Tajikistan, Palestine, Vatican City, Taiwan, Republic of Congo (Samur, 2007: 145).

Turkey, on the other hand, did not remain indifferent to the global climate change problem and signed the Kyoto Protocol in 2009. Turkey, which is a party to the Kyoto Protocol, has an obligation to move from a fossil fuel-based development policy to renewable energy and development policy. As a requirement of Turkey's adoption of the Kyoto Protocol, its effective use of renewable energy sources will contribute to reducing existing CO<sub>2</sub> emissions. Within the Kyoto Protocol, countries that cause CO<sub>2</sub> emissions above the value determined by this application, which will take effect after 2020, will have to pay financial compensation if they do not have sufficient carbon certificates (Tanınmış, 2010: 106).

The most effective way to protect the environment is to ensure the monetary participation of the person in the cost of environmental consumption and this monetary participation is only possible through environmental taxes. The primary purpose of ecological taxes is to create an environmentally sensitive production and consumption structure through taxes in order to reduce the life threat posed by environmental pollution to all living things and to achieve the economic gains that will be achieved by improving the environment (Öner, 2014: 140).

When we look at "Ecological Taxes" as a concept, "eco-taxes" or "green tax" in English are defined as "green tax" in English and the concept of "tax" here is defined as payments to the state free of charge and mandatory, where the benefit cannot be divided into taxpayers. Environmental taxes, which are a compensatory tax received from polluters as a result of business activities, refer to the mandatory and unrequited payments received on the bases associated with the environment and the pictures and fees received in return for more or less the service offered (Çelikkaya, 2011: 98).

Environmental taxes are monetary values unilaterally collected by public administrations from real and legal persons in order to prevent environmental values and ecological destruction, to improve the environment, to eliminate degradation and to prevent environmental pollution. The main purpose of environmental taxes; first of all, it is the event of protecting the environment and minimizing the harmful effects of the resulting environmental pollution. In accordance with the pollutant pay principle, it is aimed to internalize environmental taxes and environmental costs caused by environmental pollution, i.e. negative externality (Reyhan, 2014: 113). Thus, it forces environmental damagers to pay the damages resulting from their activities (EEA, 1996: 8).

It is possible to list the characteristics of environmental taxes aimed at reducing harmful behaviors to the environment as follows (EEA, 1996: 8; Ferhatoğlu, 2003: 2-3; Toprak, 2006: 155):

- It increases the cost of environmentally harmful goods, services or activities, so it directs producers and consumers to activities that are not harmful to the environment, enabling them to avoid harmful behaviors.
- It contributes to technological development by directing manufacturers to develop new production techniques.
- It constitutes an additional source of income for governments.
- While increasing tax revenues, a positive contribution to the economy is made by reducing the tax burden on labor and capital.

It helps to eliminate the differences between the special social costs and special social benefits that individuals are burdened with caused by pollution.

According to Eurostat, environmental taxes are evaluated in four parts. These taxes are based on energy, transportation, pollution and natural resources. In the EU, energy taxes are mostly considered carbon taxes (Reyhan, 2014: 114).

A type of environmental tax, the carbon tax is a tax per emissions unit. Due to the problems encountered in determining the amount of this tax, Baranzini et al. (2000) stated that the carbon tax can be obtained in two ways, proportional to the amount of carbon emissions released when burned (Hotunluoğlu and Tekeli, 2007: 270):

- Determination of a carbon tax for each ton of carbon emissions released into the air,
- Determination of a carbon tax per specific energy unit.

Any economic institution that emits carbon emissions into the air becomes a taxpayer, that is, a tax debtor, by adding the social cost to its total cost, which is subject to tax per the amount of carbon emission resulting from the damage it causes to the environment. The economic institution, which is the carbon taxpayer, is obliged to pay this tax amount to the tax creditor at the rate of the amount of greenhouse gas emissions it releases into the environment. A carbon tax is not just a type of tax that the manufacturer will bear. Economic units taxed according to the carbon emissions limit can reflect this tax on their costs. In this case, the contractor of the carbon tax that the business will bear is the consumer (Yerlikaya, 2003: 697).

Today, carbon tax practices are largely seen in Europe. Countries that impose a national carbon tax are in Europe; Finland, Iceland, Norway, Sweden, Denmark, Estonia, Latvia, Ireland, Slovenia, Switzerland, Poland, Portugal and the United Kingdom. Outside Europe, it is Mexico, Colombia, Chile, India and Japan. In Canada, a carbon tax is not applied, but it is in the planning stage (Balı and Yaylı, 2019: 308). In the EU, carbon tax implementations are considered an important financial instrument in achieving environmental policy objectives (Tanrıvermiş, 1997: 3).

### 3. ENVIRONMENTAL TAXES IN TURKEY

The first tax enacted within the scope of combating environmental pollution in the Turkish Tax System is the Environmental Cleaning Tax (ECT). Bag fee can also be evaluated within this scope. Although it is not a direct environmental tax, Motor Vehicle Tax (MVT) and Special Consumption Tax (SCT) are considered other environmental taxes as they provide environmental contributions in terms of tariffs, rates, exemptions and exceptions (Ertekin and Dam, 2020: 66). In this context, the carbon tax, which is the application area especially in EU countries, is not yet implemented in Turkey (Balı and Yaylı, 2019: 318).

#### 3.1. Environmental Cleaning Tax

The ECT, also known as the garbage tax, is a type of tax that is paid by those who use all housing, workplaces and other structures within the municipal boundaries. The tax fee is reflected in the water bill in the dwellings (Öz

and Kutbay, 2016: 256). The tax has no effect on the reduction of other solid waste, as it is calculated on the basis of the amount of water consumed only in buildings. As per the legal regulation, business owners pay this tax to the municipality in two equal installments every year. Some institutions specified in the law (general and added budget administrations, provincial special administrations, buildings used in the embassy and consular services, buildings belonging to the units established by municipalities and villages, buildings used by organizations and universities such as hospice, Red Crescent, KYK student dormitories, places of worship, etc.) are exempt from this tax (Çitil and Kınacı, 2011: 35).

ECT, which is determined in the Municipal Income Law No. 2464, is a tax that concerns those who use housing, workplace and other buildings. The amount of tax is determined on the basis of the amount of water consumption in the dwellings. ECT; for the year 2021, residents of metropolitan areas and housing units were determined as 50 cents for every 1 cubic meter of water they used and those living in other cities were 38 cents.

The main purpose of the ECT is to combat environmental pollution and to reduce the negative effects of environmental pollution on nature, health and economy. In terms of the subject matter of the tax, its tariff and the taxpayer, this purpose cannot be said to have been effectively fulfilled (Üyümez, 2016: 433). It is seen that this tax has not been successful in reducing environmental pollution and the waste amount and eliminating the collected wastes in practice. In 2018, the ECT in Turkey accounted for 4.42% of local government revenues and 0.051% of general administration budget revenues and has a very low share of total tax revenues of 0.085%. Current estimates show that the proceeds from the ECT cover only 25% of the cost of waste collection and disposal. (Samancı and Karagöz, 2019: 73). Therefore, it is very difficult to say that the ECT is a very effective tool in the protection of the environment and the fight against environmental pollution.

### 3.2. Bag Fee and Recovery Contribution

Bag fee regulation in Turkey was made in 2018 with the additional article 13 added to the Environmental Law. Accordingly, the purpose of the regulation is stated in the relevant law as follows: “In order to efficiently manage resources and prevent environmental pollution caused by plastic bags, plastic bags are given to the user or consumer at the points of sale for a fee. The base fee to be applied is determined not less than 25 cents and is updated for each year through the commission to be established by the Ministry”. As of January 1, 2019, paid bags have been introduced in grocery stores (Environmental Law No. 2872, Annex 13).

It is aimed to prevent environmental pollution with the law that comes into force to reduce the use of plastic bags and packaging. Plastic bags and packaging also have some negative economic effects and are also made of oil (Romer, 2010: 443). It is known that our country is heavily dependent on the outside in oil (Çalışkan, 2009: 303). The current account deficit is also expected to decrease as the use of plastic bags and packaging will decrease with the law. As a matter of fact, with the introduction of the law, the citizens began to feel the bag fee paid for the development of tax awareness and it became visible that the use of plastic bags decreased at the points of sale.

The bags used for transportation purposes with the bag fee arrangement are made paid and 15 cents of this fee received from the consumer is declared under the name of “Recovery Participation Share” and paid by taxpayers to the tax authorities they are affiliated with and transferred to the Ministry of Environment and Urbanization. The remaining 10 cents must be accounted for as the cost of the plastic bag (Kısacık, 2019: 190).

For years, bag fee and recovery contribution are shown in Table 1.

**Table 1.** Bag Fee and Recovery Contributions (Cents) as of Years

Years	VAT 18%	Bag Fee	Recovery Contribution
2019	0,04	25 cents	15 cents
2020	0.04	25 cents	18 cents
2021	0.04	25 cents	19 cents

Source: Created by authors.

18% VAT is applied to the bag fee. In this case, for example, when you buy one bag from any grocery store in 2021, you also pay 0.04 cents VAT for Recovery Contribution. As the table shows, Recovery Contribution, which was 18 cents in 2020, was 19 cents for 2021, meaning that the share of the state from the 25-cent bag increased from 75.25 percent to 91.33 percent. In this case, 19 cents of the grocery bag purchased by the citizen is transferred to the Ministry of Environment, 2.2 cents to the markets and 3.8 cents to the Ministry of Finance and Treasury in VAT (Verginet.net, 2020).

### 3.3. Motor Vehicle Tax

Looking at the basic criteria of the tax, it is seen that the Motor Vehicle Tax (MVT), which is applied in different ways in developed or developing countries, aims to provide income and sometimes protect the environment, taking into account many different criteria from the age of the vehicle to the volume of cylinders, from passenger-carrying capacity to the amount of carbon dioxide emissions (McMorran and Nellor, 1994: 9). MVT is evaluated within environmental taxes because it contributes indirectly to the fight against environmental pollution.

Due to factors such as developing technological conditions and population growth, the increase in motor vehicle use has a negative effect on the environment. MVT, in terms of base structure, is one of the specific qualified tax practices. When creating a tax tariff; criteria such as age, type, the purpose of use, seating capacity, engine cylinder volume and a maximum takeoff weight of the vehicle covered by the tax are taken into account. The amount of tax increases as the engine cylinder volume and engine power of the vehicles increase. Because vehicles with a larger engine cylinder volume emit more emissions. In contrast, as the age increases, so does the tax (Sugözü et al., 2014: 122). MVT constitutes taxes levied on wealth. In the existing MVT system implemented in Turkey, older vehicles are taxed in lower amounts, while new vehicles are charged higher amounts of MVT (Öncel et al., 2008: 391; Bilici, 2008: 142).

When we look at the practices in the EU, it is seen that MVT is applied in the form of road and environmental tax. The criteria taken into account when determining the amount of MVT in EU member states focus on fuel consumption, weight, cylinder volume and CO<sub>2</sub> emissions (Kaplan, 2012: 216). The weight criterion is directly proportional to the total weight of the vehicles as the damage they cause to the road they use. It is thought that the person's wealth increases as the total weight of the vehicle increases, and in this case the amount of tax to be paid increases. The underlying reason for the use of criteria such as fuel consumption, cylinder volume and CO<sub>2</sub> emissions is the idea that toxic gas will be released into the environment (Bozdoğanoglu, 2008: 2).

### 3.4. Special Consumption Tax

SCT is a tax taken from all goods and services except exceptions and exemptions, which comes into force within the framework of EU compliance and is taken in the manufacturing and importation of luxury consumer goods listed in the law and goods that harm human and environmental health, and which has a very important share in public revenues (Turhan, 1993: 260; Taylar, 2010: 450).

The SCT is collected on a limited number of goods that are easy to tax and have low elasticity of demand. With the introduction of SCT, many taxes such as Fuel Consumption Tax, Fuel Price Stability Fund, Vehicle Purchase Tax, Traffic Registration Fee, Environmental Pollution Prevention Fund, Additional Vehicle Purchase Tax have been repealed. SCT is included in the group of taxes received on consumption. The taxpayer of taxes on consumption is not actually consumers, but those who sell these goods or provide the services collect these taxes from the buyers together with the sale price. Therefore, taxes are reflected to the consumer of the goods together with the sales price. As a result, these taxes, which are deposited by the taxpayer in the tax office, are imposed on the final consumers (Oktar, 2020: 25-26).

## 4. LITERATURE REVIEW

Some of the studies on the impact of environmental taxes on the environment in the literature consist of theoretical and some of the studies consist of applied studies. Most of the empirical studies are aimed at EU countries, which are national carbon tax enforcers. In the case of Turkey, although there is no national carbon tax, environmental taxes are applied under the name of environmental tax. In this context, there is no empirical study in the literature that investigates the effect of these taxes on emissions in the case of Turkey.

In the theoretical studies, general evaluations were made regarding the effects of environmental taxes on the environment. Baranzini et al. (2000) examined the effectiveness of carbon taxes in reducing CO<sub>2</sub> emissions in some examples of countries around the world. Countries around the world such as the Netherlands, Sweden, Norway, Denmark, the UK and Germany are the countries that impose carbon taxes. In these countries, the carbon tax is used as an effective policy tool for reducing the environmental pollution. Another study in the literature is the work of Pizer (2002). He stated that price control policies that support environmental taxes in reducing greenhouse gas emissions are a more effective tool than quantity control policies.

Üyümez (2016) examined the positive impact of motor vehicle tax on the environment in the case of the EU and Turkey. In eu member states from the past to the present, the contribution of motor vehicle tax on the environment was taken into account and the income it provided to the state was pushed to the second place. In Turkey, the opposite approach has been taken Balı and Yaylı (2019) evaluated the viability of the carbon tax in Turkey. They stated that it is necessary to implement the carbon tax as a new policy tool for reducing CO<sub>2</sub> emissions in the process of achieving sustainable development in Turkey.

Some of the empirical studies examining the relationship between environmental tax and CO<sub>2</sub> are summarized in Table 2 in terms of the author/authors of the study, the country/countries covered, the methods used and the results of the analysis.

**Table 2.** The Relationship Between Environmental Tax and CO<sub>2</sub>: Literature Summary

Authors/Authors	Country/Countries	Method	Results
Hotunluoğlu and Tekeli (2007)	18 EU Countries	Panel Data Analysis	In the countries included in the analysis, the impact of the carbon tax on emissions is negative but statistically meaningless.
Lin and Li (2011)	Finland, Norway, Denmark, Sweden, Netherlands	Variance of Difference Method	In Finland, a carbon tax has a negative and meaningful effect on CO <sub>2</sub> emissions. In Denmark, Sweden and the Netherlands, this effect is statistically meaningless. The mitigating effect of the carbon tax on emissions is irrelevant, as the rapid growth in energy production in the oil and gas sectors in Norway has led to increased carbon emissions.
Allan et. al. (2014)	Scottish	Energy-Economy-Environment Model	The carbon tax imposed in Scotland has an emission-reducing effect.
Bayar and Şaşmaz (2016)	Denmark, Finland, Netherlands, Sweden and Norway	Panel Causality Test	There is no meaningful relationship between a carbon tax and emissions. However, a one-way causality relationship from economic growth to CO <sub>2</sub> emissions has been identified.
Tekin and Şaşmaz (2016)	25 EU Countries	Panel Data Analysis	It has been determined that total environmental taxes and transportation taxes have no effect on emissions, while energy taxes have an emission-reducing effect.
Topal and Günay (2017)	53 OECD Ülkesi	Panel Data Analysis	Environmental taxes have a meaningful and positive impact on environmental quality. However, this effect has been seen to be stronger in developed economies than in developing economies.
Polat and Polat (2018)	25 EU Countries	Panel Data Analysis	There is a cointegration relationship between the series. The effect of an environmental tax on CO <sub>2</sub> emissions is significant and negative.
Hajek et. al. (2019)	Sweden, Finland, Denmark, Ireland and Slavenya	Panel Data Analysis	It has been concluded that the carbon tax is effective in reducing emissions from fossil fuel consumption.
Kiuiila et. al. (2019)	Czech Republic	Static General Balance Model	The impact of national emissions charges on CO <sub>2</sub> is negative.
Ghazouani (2020)	Denmark, Finland, Sweden, Netherlands and Norway	Trend Score Matching Method	The carbon tax has a significant impact on reducing carbon emissions.

## 5. MODEL, DATA AND ANALYSIS RESULTS

### 5.1. Estimated Model and Data Definitions

In this study, the effect of environmental taxes on CO<sub>2</sub> emissions in Turkey was investigated for the period 1994-2015. The data and data definitions used in the analysis are shown in Table 3.

**Table 3.** Description of Variables

Variables and Measurement	Source	Symbol
CO <sub>2</sub> Emissions (Metric Tons Per Capita)	World Bank, World Development Indicators Database	CO <sub>2</sub>
Environmental Tax (% of GDP)	OECD Database	ET
GDP Growth Rate (annual %)	World Bank, World Development Indicators Database	GDP
Renewable Energy Consumption (% of total final energy consumption)	World Bank, World Development Indicators Database	REC

Source: World Bank (2021); OECD (2021).

Natural logarithm of all variables used in the analysis was taken. The model predicted in the study is as follows:

$$LCO2_{it} = \alpha + b_1LET_{it} + b_2LGDP_{it} + b_3LREC_{it} + \varepsilon_{it} \quad (1)$$

## 5.2. Analysis Results

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used to determine the stationarity of the series. Then, the cointegration relationship between the series was examined with the Johansen Cointegration Test. The long-term coefficients of the variables were estimated with FMOLS, DOLS and CCR Models.

The ADF test, developed by Dickey and Fuller (1981), includes the regression of the series whose stationarity is to be investigated, its own lagged value and differences, and the regression is as shown in equation 2:

$$\Delta Y_t = \alpha + \beta_t + \delta Y_{(t-1)} + \vartheta \sum \Delta Y_{(t-1)} + \varepsilon_t \quad (2)$$

$\Delta$  in equation 2, the difference processor is  $\varepsilon_t$  is the term for stationary error. In the unit root test, the latency length for each series can be selected according to the Akaike and Schwartz information criteria. In ADF testing, the zero hypothesis states that the series contains unit roots at the level value. If the coefficient of  $\delta$  is statistically significant, the zero hypothesis is rejected and the series is considered stable (Kızılgöl, 2006: 57).

ADF testing within unit root tests is a heavily used test. With the PP test developed by Phillips and Peron (1988), the serial correlation and changing variance problem caused by errors in the ADF test was eliminated. The equation in which the PP test is applied is as follows:

$$\Delta Y_t = \alpha Y_{t-1} + x_t' \delta + \varepsilon_t \quad (3)$$

In equation 3,  $\alpha = \rho - 1$ ,  $x_t$  means “intercept” or “trend and intercept”. In PP testing, the basic hypothesis is that there is a unit root. In this test, the hypotheses are  $H_0: \alpha = 0$  and,  $H_1: \alpha < 0$ . The probability distribution of test statistics is the same as the ADF test (Çağlayan and Saçaklı, 2006: 124).

Table 4 provides unit root test results. As seen in Table 4, according to the ADF and PP test results, while the CO2 and REC variables for the intercept model contain unit root in the level value, they become stationary when the first difference is taken. ET and GDP variables are stationary both at level value and first difference. According to the results of the ADF and PP unit root tests for the trend and intercept model, most of the variables contain a unit root at the level value. When the first difference of the variables is taken, the series becomes stationary. Accordingly, the series became stationary when the first difference of CO2, ET and REC variables was taken. The GDP variable, on the other hand, is stationary at the level value and the first difference.

**Table 4.** ADF and PP Unit Root Test Results

For Intercept		ADF		PP	
Dependent Variable	LCO2	Level	First Difference	Level	First Difference
		-1.309105 (0.6054)	-4.940497* (0.0009)	-1.302836 (0.6083)	-5.126654* (0.0006)
Independent Variables	LET	-3.174646** (0.0362)	-4.533175* (0.0021)	-7.869287* (0.0000)	-4.533175* (0.0021)
	LGDP	-3.720362** (0.0116)	-5.688914* (0.0002)	-3.702082** (0.0120)	-10.71479* (0.0000)
	LREC	-1.735573 (0.4000)	-5.674081* (0.0002)	-1.930421 (0.3129)	-6.228956* (0.0001)
For Trend and Intercept		ADF		PP	
Dependent Variable	LCO2	Level	First Difference	Level	First Difference
		-2.605128 (0.2815)	-4.806674* (0.0054)	-2.665778 (0.2585)	-4.941851* (0.0042)
Independent Variables	LET	-1.90967 (0.6140)	-6.117606* (0.0004)	-2.716027 (0.2404)	-7.137129* (0.0001)
	LGDP	-3.620376*** (0.0523)	-5.522578* (0.0013)	-3.599501*** (0.0544)	-10.42279* (0.0000)
	LREC	-2.434656 (0.3531)	-4.399909** (0.0129)	-2.434656 (0.3531)	-7.370016* (0.0000)

Note: \*, \*\* and \*\*\* indicate that the coefficients of 1%, 5% and 10% respectively do not contain unit-roots.

Johansen (1988) and Johansen and Juselius (1990) use the Maximum Eigen Value and Trace statistics to determine the long-term relationship between variables. These tests are expressed in equations (4) and (5), respectively.

$$J_{trace} = -T \sum_{i=r+1}^n \ln(1 - \gamma_i) \quad (4)$$

$$J_{max} = -T \ln(1 - \gamma_{r+1}) \quad (5)$$

Here  $T$  is the sample size and  $\gamma_i$  is the  $i$ . largest canonical relationship. In the Maximum Eigen Value test, the existence of at most  $r$  cointegration vectors is tested against the alternative hypothesis claiming the existence of  $r+1$  cointegration vectors. On the other hand, in the Trace test, the existence of at most  $r$  cointegration vectors is tested against the alternative hypothesis expressing the existence of at least  $r+1$  cointegration vectors (Sinan, 2018: 688; Özcan and Arı, 2013: 111; Altay Topcu, 2021: 35).

Johansen Cointegration test results are shown in Table 5.

**Table 5.** Johansen Cointegration Test Results

Hypotheses	Trace Test			
	Eigenvalue	Trace Statistic	Critical Value (5%)	Prob Value
$r = 0^*$ None*	0.882572	86.00750	47.85613	0.0000
$r \leq 1^*$ At most 1*	0.742424	45.31081	29.79707	0.0004
$r \leq 2$ At most 2	0.556688	19.53843	15.49471	0.0116
$r \leq 3$ At most 3	0.193343	4.082277	3.841466	0.0433
Hypotheses	Max Eigen-Value Test			
	Eigenvalue	Trace Statistic	Critical Value (5%)	Prob Value
$r = 0^*$ None*	0.882572	40.69668	27.58434	0.0006
$r \leq 1^*$ At most 1*	0.742424	25.77238	21.13162	0.0103
$r \leq 2$ At most 2	0.556688	15.45616	14.26460	0.0323
$r \leq 3$ At most 3	0.193343	4.082277	3.841466	0.0433

\* The Trace statistic indicates that there is 4 cointegrated vector at 0.05 significance level.

\* The Maximum Eigen-Value statistic indicates that there is 4 cointegrated vector at 0.05 significance level.

As seen in Table 5, Trace and Maximum Eigen-Value statistics for all hypotheses are greater than the critical value. Accordingly, the first hypothesis is rejected at the 5% significance level and the other hypotheses are accepted. In other words, all test results show that there are four long-term cointegrating vectors among the variables. According to this result, there is a significant long-term relationship between CO2 and ET, GDP and REC.

After the cointegration relationship was found between the variables, the long-term coefficients of the series were estimated using FMOLS, DOLS and CCR Models. FMOLS, DOLS and CCR estimation results are shown in Table 6.

**Table 6.** Estimation Results

Dependent Variable: LCO2			
Methods			
Variables	FMOLS Coefficient	DOLS Coefficient	CCR Coefficient
LET	-0.185363** (0.0362)	-0.357855* (0.0001)	-0.169035** (0.0388)
LGDP	0.025742 (0.3920)	0.059743*** (0.0817)	0.027984 (0.4410)
LREC	-0.875858* (0.0000)	-0.880184* (0.0005)	-0.878140* (0.0000)
C	1.681268* (0.0000)	1.753588* (0.0000)	1.674057* (0.0000)
$R^2$	0.845633	0.979070	0.844939

**Note:** \*, \*\* and \*\*\* indicate that the coefficients are significant at the 1%, 5% and 10% significance level, respectively.

As shown in Table 6, the LET and LREC variables have a statistically significant effect according to the FMOLS and CCR Model results. According to the DOLS results, all the variables included in the analysis were found to be significant. According to all estimation results, the 1% increase in LET leads to a decrease of 0.18%, 0.35% and 0.16% in CO2, respectively. In other words, the effect of environmental taxes on CO2 emissions in Turkey is negative. On the other hand, according to the FMOLS and CCR estimation results, it was concluded that the LGDP variable did not have an effect on CO2. According to the DOLS model results, the LGDP variable has a positive and statistically significant effect on CO2.



Another conclusion obtained from FMOLS, DOLS and CCR models is that the effect of renewable energy consumption on Turkey's carbon dioxide emissions is negative and statistically significant at the level of 1% importance. This effect is stronger than the negative effect of environmental taxes on carbon dioxide emissions in Turkey. It was concluded that the 1% increase in LREC resulted in a decrease of 0.87%, 0.88% and 0.87% in CO<sub>2</sub>, respectively. The results obtained in the analysis are consistent with theoretical literature and largely empirical literature.

## CONCLUSION

The unconscious consumption of scarce natural resources and the destruction of nature, directly and indirectly, threaten countries. In this context, the problem of environmental pollution becomes a global problem. The fact that greenhouse gas emissions continue to increase globally and the negative effects of climate change are becoming increasingly palpable has brought the Kyoto Protocol into the spotlight. Our country became a party in 2009 to this protocol, which many countries in the world are parties to. The countries that are parties to this protocol have undertaken different rates of greenhouse gas emission reduction/limitation obligations as a result of the negotiations. Our country does not yet have a commitment to limit/reduce digitized emissions.

Carbon tax, one of the types of taxes used to solve the problem of environmental pollution, affects the cost of the product produced, increasing the cost of using these products through the price mechanism and encouraging the use of fossil fuels less. The producer is subject to a tax on the amount of carbon dioxide gas it releases into the environment. Thus, the manufacturer, which is a taxor, adds social cost to the total cost of the product and ensures the internalization of negative externalities. The state, which has become a tax creditor, generates revenue and imposes an extra expense on taxpayer-owned businesses. The carbon tax implemented in this way both reduces harmful CO<sub>2</sub> emissions to the environment and provides an additional income to the state budget. The fact that countries with large economy do not participate in global agreements such as the Kyoto Protocol, which can contribute positively to the environment, does not achieve the desired purpose of this tax.

In this study, the effectiveness of environmental taxes on CO<sub>2</sub> emissions in Turkey was examined in 1994-2015. According to the results of the analysis, although environmental taxes applied in Turkey are effective on CO<sub>2</sub> emissions, it is seen that the coefficient value of the environmental tax variable is low. In order for this effect to be stronger, the revenues from the ECT in Turkey should be at least sufficient to cover the costs of collecting and disposal waste. In addition, it can be said that if a carbon tax is implemented in our country, whose direct focus is on reducing greenhouse gas emissions in nature, this tax will have a more positive impact on the environment.

The implementation of a carbon tax can be considered as an effective policy tool in the country's focus on renewable energy sources and its contribution to the environment. Thus, the country's sustainable development goal should be supported. Therefore, the state is required to establish tax arrangements in this regard. In addition, it is seen that the environmental taxes in the Turkish Tax System do not have the desired level of environmental impact. Therefore, environmental taxes should be used effectively along with other financial or market instruments within the scope of combating environmental pollution.

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# The Effect of Economic Voting Theory on Voter Preference within the Scope of Political Marketing

*Politik Pazarlama Kapsamında Ekonomik Oylama Teorisinin Seçmen Tercihine Etkisi*

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## ABSTRACT

Determination of voter behaviour in the scope of political marketing is the most important factor in terms of political powers and parties at present. Voters are influenced by a lot of factors among which economic factors are the most important ones. The view that economical factors affect voter preference is known as an economical voting theory in the literature. In this context, voters assess the past economic performances of political parties and their possible future economical performances and reflect their preferences accordingly. In the scope of this theory, voters reward existing political parties with their votes at the ballot box due to positive economical developments while punishing them for negative economical developments. The aim of this study is to reveal the importance of voter preferences within the scope of political marketing and determine the economical factors that influence voter preferences in Turkey. In this context, the effect of economical variables on vote rates was investigated through an econometric model. Within the scope of the analysis, data between 1990 and 2019 from Turkey were used. First, the stationarity levels of the variables used in the study were determined by Extended Dickey-Fuller and Philips-Peron unit root tests. Second, the short-term and long-term relationships between the variables were tested with the autoregressive distributed lag bounds test. Finally, the Todo-Yamamoto causality test was used to determine the causality relationship between the variables used in the study. As a result of the study, it was concluded that the effect of the rate of gross domestic product per capita on the vote in the short and long term is positive but statistically insignificant. In addition, another important finding of the study is that the effect of the inflation rate on the vote is negative and statistically significant in both the short and long term. Finally, as a result of the causality test, it was determined that there is a one-way causality relationship from inflation to vote rate.

## Anahtar Kelimeler:

Politik Pazarlama,  
Ekonomik Oylama,  
Seçmen Davranışı,  
Türkiye,

## ÖZET

Günümüzde politik pazarlama kapsamında seçmen davranışının belirlenmesi siyasal iktidarlar ve partiler açısından en önemli bir faktördür. Seçmenler birçok etkenden etkilenmekte ve bunlar arasında en önemli etken olarak ekonomik faktörler gelmektedir. Ekonomik faktörlerin seçmen tercihini etkilediği görüşü literatürde ekonomik oy verme teorisi olarak bilinmektedir. Bu bağlamda seçmenler siyasi partilerin geçmişteki ekonomik performansları ile gelecekte olması muhtemel ekonomik performanslarını değerlendirmekte ve bu doğrultuda tercihlerini şekillendirmektedir. Bu teori kapsamında seçmenler olumlu ekonomik gelişmelerden dolayı mevcut siyasi partileri oylarıyla sandıkta ödüllendirirken olumsuz gelişmelerde ise cezalandırmaktadır. Bu çalışmanın amacı, politik pazarlama kapsamında seçmen tercihlerinin önemini ortaya koymak ve seçmen tercihlerinde etkili olan ekonomik faktörleri Türkiye için tespit etmektir. Bu kapsamda oluşturulan ekonometrik model ile ekonomik değişkenlerin oy oranları üzerindeki etkisi araştırılmıştır. Analiz kapsamında Türkiye'ye ait 1990–2019 dönemi arası veriler kullanılmıştır. Çalışmada ilk olarak kullanılan değişkenlerin durağanlık düzeyleri Genişletilmiş Dickey-Fuller ve Philips-Peron birim kök testleri ile tespit edilmiştir. İkinci olarak, değişkenler arasındaki kısa ve uzun dönem ilişkisi dağıtılmış gecikmeli otoregresif sınır testi ile test edilmiştir. Son olarak ise çalışmada kullanılan değişkenler arasındaki nedensellik ilişkisinin tespiti için Todo-Yamamoto nedensellik testi kullanılmıştır. Çalışmanın sonucunda kısa ve uzun dönemde kişi başı gayri safi yurt içi hasıla oranının oy üzerindeki etkisi pozitif fakat istatistiksel olarak anlamsızdır. Ayrıca çalışmada hem kısa hem de uzun dönemde enflasyon oranının oy üzerindeki etkisi negatif ve istatistiksel olarak anlamlı olduğu tespit edilen önemli bir bulgudur. Son olarak yapılan nedensellik testi sonucunda enflasyondan oy oranına doğru tek yönlü bir nedensellik ilişkisinin olduğu tespit edilmiştir.

## 1. INTRODUCTION

The importance of voter preferences in the determination of political power within the context of political marketing in globalizing and developing countries is increasing with each day. Within the context of political marketing, in the election campaigns of political parties, economic variables are frequently discussed and election manifestos are prepared in this direction. The frequent use of economic variables within the scope of political marketing requires examining the relationship between economic factors and voter preferences. The relationship between the votes received by political parties and voter preferences is grounded on the relationship between economic variables and voter behaviour. Voters decide according to the economic performance of the political party in the government. This approach is known in the literature as the economic voting theory. In the economic voting theory, it is argued that voters act according to their self-interests and make a decision under the influence of economic developments that affect them. In this context, under the name of economic voting, the rate of votes received by governments in elections and the economic policies they have implemented are compared. In this connection, models are created based on the assumption that voters hold the current government directly responsible for positive or negative economic developments (Gomez and Wilson, 2001: 899; De Neve, 2009: 1; Kiwit and Rivers, 1985; Sencer, 1974: 277; Akgün, 1999: 7; Ercins, 2007; Çarkoğlu, 1997: 85).

Many times, the economic conditions in the market determine the voter behaviour, or in other words, voters who evaluate the economic indicators in the market make their decisions based on the changes that are important to them. In this respect, voters evaluate the current and past periods of political power and vote for the parties that benefit them the most and can overcome basic economic problems (Erdoğan, 2004:105; Ercins, 2007:28; Sencer, 1974; Çinko, 2006:103; Durr, 1993; Verstyuk, 2004; Powell and Whitten, 1993; Tan, 1998: 149-150; Adaman et al., 2001; Çınar, 2010). In the current study, economic variables that are used in the evaluation of governments and that are influential on the changes in voter preferences are used. These variables are inflation and per capita gross domestic product. These variables are of great importance in terms of expressing the living standard of voters on a country basis. Developments in the political and administrative life of a country lead to changes in the economic life of the citizens of the country and development in the economic conditions of a country lead to changes in the political and administrative structure of the country (Tuncel, 2010: 764-766; Özaydın, Oğuz and Tekbaş, 2018: 204).

The purpose of the current study is to determine the effects of economic factors that are effective in voter preferences by revealing the importance of voter preferences in the economic development and growth of countries in the context of political marketing. In this regard, the policy suggestions to be made on the basis of the results of the current study are expected to make contributions to the literature. In addition, determination of the economic variables that are effective in the preferences of voters in Turkey can help governments, political parties, candidates and relevant public institutions and organizations to make decisions and create strategies.

In this context, with the empirical model created in the current study, the effect of the inflation and per capita gross domestic product variables on the voting rate of political parties in Turkey was investigated using the annual data between the years 1990 and 2019. First, the stationarity levels of the variables used in the study were determined with Augmented Dickey Fuller and Philips-Peron unit root tests. Secondly, the short- and long-term relationships between the inflation and per capita gross domestic product variables and the voting rate of political parties were tested with the cointegration test based on the autoregressive distributed lag bounds test. Finally, Todo-Yamamoto causality test was used to determine the causality relationship between the variables used in the study.

## 2. LITERATURE REVIEW

There are very few studies in the literature on the relationship between vote rate and economic factors in Turkey. The first studies examining the relationship between vote rate and economic factors started in the 1970s and have continued up to the present. Such studies examining the relationship between vote rate and economic factors are mentioned in the literature under the name of economic voting theory. In this context, the literature review made on the relevant national and international studies is presented here.

The study conducted by Kramer (1971) in the United States is considered to be one of the first studies in this field. This study by Kramer tests the assumption that voter preferences change according to the past economic performance of the current government. This assumption is generally referred to as retrospective voting in the literature. As a result of this study, it was determined that the unemployment rate did not affect voter preferences, while the change in real income per capita during the election period significantly affected voter preferences.

Fair (1978) examined the voting behaviour of voters in the United States. In light of the findings obtained from this study, it was concluded that voters voted by evaluating the economic performance of the ruling party, especially in the past year, while determining their preferences. Another important finding of this study is that voters reward the ruling party with their votes at the ballot box due to the increase in real gross domestic product and gross domestic product per capita.

Hibbs (1977) examined the relationship between the unemployment and inflation variables and the voting rates of political parties in 12 European and North American countries. As a result of the analyses made in the study, it was determined that the low and middle-income group voters mostly changed their preferences depending on the unemployment variable. Another important finding in the study is that high-income voters determine their preferences depending on the inflationary environment.

Mueller (1970) analyzed presidential popularity in the United States. As a result of the analyses made, it was determined that the presidents who showed good economic performance during their term of office were rewarded by voters while their bad economic performance was punished by voters. Another finding of the study is that one unit increase in the unemployment rate will decrease the voting rate of the current government or political party by three points.

Çarkoğlu (1997) investigated the effect of economic variables on voter preferences in Turkey. As a result of the study, it was determined that the increase in inflation and unemployment rates led to a decrease in the support of the voters to the ruling party, while the growth in the per capita gross domestic product increased the support for the ruling party.

Akgün (1999) examined the relationship between voter preferences and economic variables in Turkey. In the study, it was determined that voters in Turkey are very sensitive to economic changes and their preferences change depending on economic variables. Another important finding in the study is that voters hold the current government party responsible for the increasing inflation rate and punish them severely with their votes at the ballot box.

Kapusızoğlu (2011) examined the effect of the economic crises in Turkey on voter preferences. As a result of the analyses made with the literature review method, it was determined that the voters who evaluated the 2001 crisis and negative economic performances strongly punished the parties in power with their votes at the ballot box in the 2002 elections.

Başlevent and Kirmanoğlu (2016) examined the theory of economic voting in Turkey under the headings of perceptions, expectations and party selection. In the study, they used binary logit estimation and survey application, which are quantitative research methods. As a result of the analyses conducted, they determined that the economic conditions in Turkey are effective on the political attitudes and behaviours of voters. In addition, they stated that voters reward or punish the current government parties according to their economic performance.

Eroğlu (2019) investigated the effect of the theory of economic voting on the voting rates of political parties. Econometric analyzes and questionnaire data were used in the study. As a result of the study, it was determined that domestic economic growth increased the vote rate of the party currently in the government. On the other hand, another important finding in the study is that economic factors also affect the preferences of voters with weak political ties.

### **3. DATASET, EMPIRICAL MODEL AND METHODOLOGY**

#### **3.1. Variables and Data Set Used in the Analysis**

From among the data used in the current study, the data on gross domestic product per capita were obtained from the database prepared by the World Bank (World Development Indicators), and the data on the inflation rate were obtained using the consumer price index (CPI), which measures the rate of change in consumption goods and services over time. The data on the inflation rate used in the model were prepared with the data obtained from the International Financial Statistics (IMF), World Bank (World Development Indicators) and Turkish Statistical Institute (TUIK) databases. Finally, the data on the voting rates of the ruling parties were generated by us by compiling the data prepared by the Turkish Statistical Institute (TUIK) and the Supreme Election Board (YSK). The variables and their symbols used in the study are presented in Table 1.

**Table 1.** Variables and their Symbols Used in the Analysis

Symbols of the Variables	Variables
GDP	GDP growth rate per capita (annual, %)
INR	Inflation rate (annual, %)
VOTR	Vote rate (%)

### 3.2. Theoretical Explanations on the Methods Used in the Analysis

Today, while examining the effects of economic factors on the preferences of voters, the use of economic variables that can be directly accessed and interpreted by voters in the analyses to be made is of great importance in terms of giving consistent results. In this context, the inflation and per capita gross domestic product variables, which can be directly accessed and interpreted by voters, were used in the current study. The following time series model was created by using these variables as independent variables in the empirical model created.

$$\text{VOTR } t = \alpha_0 + \alpha_1 \text{ GDP } t + \alpha_2 \text{ INR } t + \varepsilon_t u_t$$

In this equation, GDP denotes per capita gross domestic product; INR denotes inflation rate; VOTR denotes the vote rates of the ruling parties and  $\mu t$  represents the error term.

Within the context of the study, the Augmented Dickey Fuller test developed by Dickey and Fuller (1981) and the PP unit root test developed by Philips and Peron (1988) were used to determine the stationarity levels of the variables. Secondly, in order to test the relationships between the voting rate and the per capita gross domestic product and the inflation rate, the autoregressive distributed lag bounds test was used. One of the reasons for using the autoregressive distributed lag bounds test in the current study is that it allows the short- and long-term relationship between stationary variables at different levels to be investigated separately. In addition, this test can be used as it gives consistent results against internal problems and autocorrelation, and it can be used even in cases where some of the variables are  $I(0)$ , some are  $I(1)$ , and all the variables (with the condition of  $D_{\max}=1$ ) are  $I(1)$  in different values (Pesaran and Shin, 1997; Destek, 2018: 274). The causality relationship between the variables in the study was analyzed with the Toda-Yamamoto (1995) causality test. While the condition of making the series stationary is sought for the Granger (1969) test, such a condition is not sought in the assumptions of the Toda and Yamamoto (1995) causality test. With the causality test of Toda and Yamamoto (1995), more consistent and accurate results are obtained without causing information loss in the variables, since the variables are included in the analysis without changing the degree of stationarity.

## 4. EMPIRICAL FINDINGS AND DISCUSSION

### 4.1. Analysis Results of Unit Root Tests

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used to determine the cointegration levels of the economic variables used in the current study such as gross domestic product per capita (GDP) and inflation rate (INR) and the voting rate (VOTR). As a result of the ADF and PP unit root test, in the hypothesis  $H_0$ , it is accepted that the series has a unit root, that is, the series is not stationary while in the hypothesis  $H_1$ , it is accepted that the series is stationary, that is, it has a unit root. If the series is not stationary, the unit root analysis is continued by taking the difference of the series. In this connection, the unit root test results of the variables used in the analysis are given in Table 2.

**Table 2.** Unit Root Test Results of the Variables

Augmented Dickey-Fuller (ADF) Test				
Variables	Level Values		In the First Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
VOTR	-0.8760 (0.781)	-2.6086 (0.2794)	-5.7362 (0.0001)*	-5.5733 (0.0005)*
GDP	-5.6604 (0.0001)*	-5.6406 (0.0004)*	-9.2486 (0.0000)*	-9.0802 (0.0000)*



INR	-4.4863 (0.0017)*	-2.3096 (0.4140)	-2.2182 (0.2049)	-3.7317 (0.0372)**
<b>Phillips-Perron (PP) Test</b>				
<b>Variables</b>	<b>Level Values</b>		<b>In the First Difference</b>	
	<b>Constant</b>	<b>Constant and Trend</b>	<b>Constant</b>	<b>Constant and Trend</b>
VOTR	-0.8892 (0.7772)	-2.6490 (0.2632)	-5.7447 (0.0001)*	-5.5836 (0.0005)*
GDP	-5.7554 (0.0000)*	-6.6892 (0.0000)*	-22.3523 (0.0001)*	-25.1817 (0.0000)*
INR	-0.8889 (0.7773)	-1.8779 (0.6399)	-5.4356 (0.0001)*	-5.3349 (0.0009)*

**Note:** \*, \*\* and \*\*\* represent the stationarity at the significance level of 1%, 5% and 10%, respectively. Hypotheses for ADF and PP unit root test; H0: Series are not stationary. H1: Series are stationary.

According to the ADF and PP unit root test results in Table 2, the hypothesis H1 was rejected and the hypothesis H0 was accepted since the vote rate (VOTR) variable used in the analysis was not stationary with the level values and it contained unit root. Since the vote rate (VOTR) variable was stationary when its first difference was taken and did not contain a unit root, the hypothesis H0 was rejected and the hypothesis H1 was accepted. Since the per capita gross domestic product (GDP) was stationary with its level values and contained unit root, the hypothesis H1 was accepted, and the hypothesis H0 was rejected. Finally, the hypothesis H1 was rejected and the hypothesis H0 was accepted, as the inflation rate (INR) variable used in the analysis was stationary with its level values only in the constant in the ADF unit root test, but it was not stationary in the level values and contained a unit root according to the PP test. In this context, since some of the variables were I(1) and some of them were I(0), the short- and long-term relationship between the variables was examined with the autoregressive distributed lag bounds test.

#### 4.2. Diagnostic Test Results of the Model

Since the variables used in the study have different degrees of stationarity, the short- and long-term relationship was examined with the autoregressive distributed lag bounds test. Since the data used in our study are annual data, the maximum number of lags was determined as three. The diagnostic tests of the model created in this direction were calculated and are given in Table 3.

**Table 3.** Diagnostic Test Results of the Autoregressive Distributed Lag Bounds Test

<b>Diagnostic Test Results</b>		
Autoregressive Conditional Heteroscedasticity (ARCH)	F=0.09	Prob. F (1,24)=0.7572
Normality Test (Jarque-Bera)	JB:1.20	P=0,5461
Serial Correlation (Breusch-Godfrey LM test)	F=0.304	Prob. F (2,18)=0.7413
Model Specification Test (Ramsey-RESET)	F=1.768	Prob. F (1,19)=0.1993
<b>Bounds Test Results</b>		
n:30	Value	k
F-Statistics	<b>6.117**</b>	<b>2</b>
Level of Significance	I(0)	I(1)
10%	3.17	4.14
5%	3.79	4.85
1%	5.15	6.36

Note 1: \*\* represents a 5% level of significance. Table critical values are the critical values found in the critical value table of Pesaran et al. (2001).

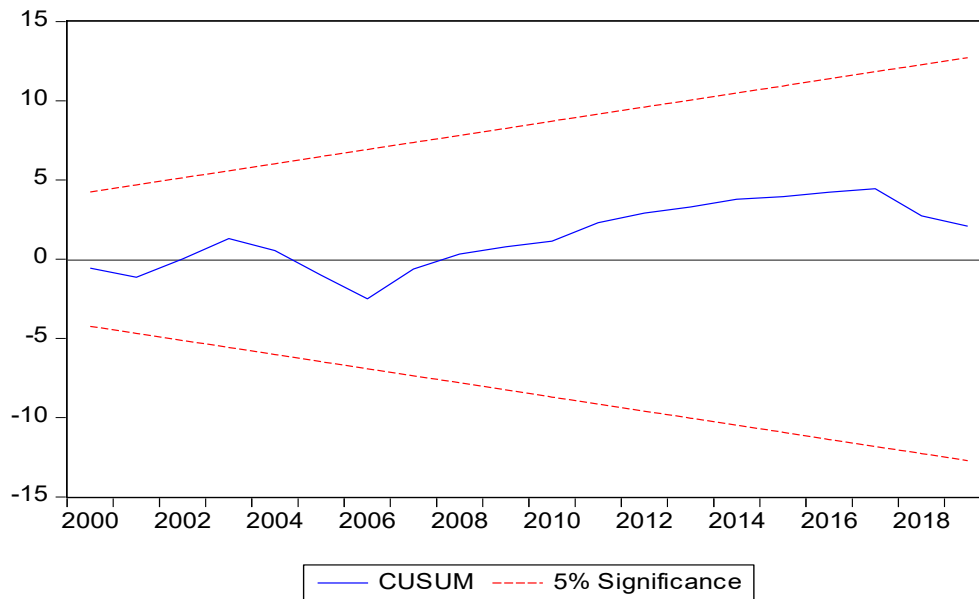
According to Table 3, when the diagnostic test results of the autoregressive distributed lag bounds test model are evaluated, it is seen that there isn't the problem of changing variance in the model according to the Breusch-Pagan-Godfrey and ARCH test results, there is no autocorrelation in the model according to the Breusch-Godfrey LM test results, the error term is distributed normally according to the Jarque-Bera test results and the model is established in the accurate specifications according to the Ramsey Reset Test results. The F statistic calculated according to the margin test results in Table 3 was found to be statistically significant at the 5% level. Therefore,

it is accepted that there is a cointegration relationship between the series. In this direction, the autoregressive distributed lag bounds test can be performed to determine the long and short term relationships between the series.

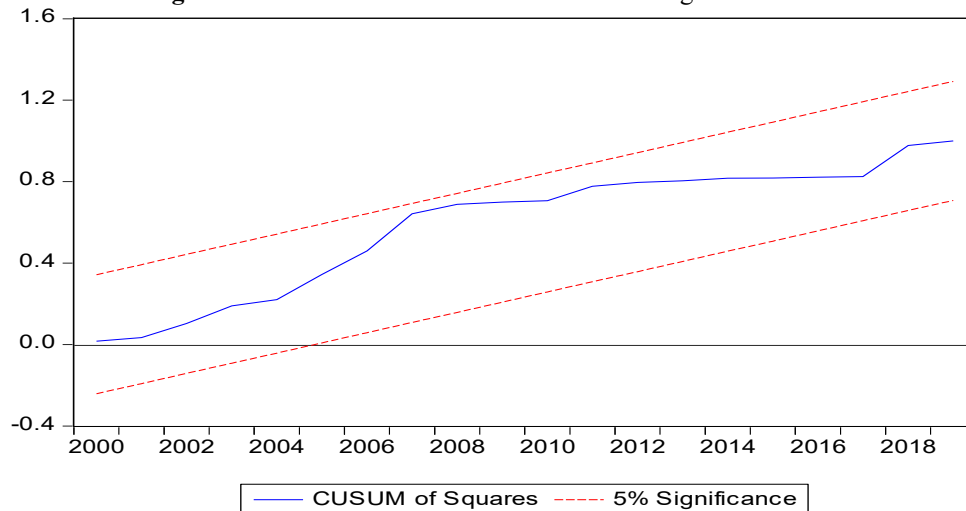
#### 4. 3. Parameter Breakage Test Results of the Autoregressive Distributed Lag Bounds Test

Within the context of the current study, CUSUM and CUSUM2 tests were used to determine whether the coefficients of the autoregressive distributed lag bounds test results were stable in the relevant period. According to the results of the CUSUM and CUSUM2 tests, it was determined that there was no structural break in the relevant periods. According to the statistics of the test results, the coefficients of the relevant variables are in the 5% critical line value range, indicating that they are stable in the long term and that there is no break in the model. CUSUM and CUSUM2 test results are presented in Figures 1 and 2 and it is seen that the presented values are completely within the critical limits. When the CUSUM and CUSUM2 graphs are examined, it is seen that the residual variances are quite stable.

**Figure 1. CUSUM Structural Parameter Breakage Test Results**



**Figure 2. CUSUM 2 Structural Parameter Breakage Test Results**



#### 4.4. Autoregressive Distributed Lag Bounds Test (ARDL) Results

It was determined that the variables were cointegrated according to the results of the unit root tests, diagnostic tests, bounds test and parameter breakage test. For the long-term coefficient estimation of the relationship between the cointegrated variables, the autoregressive distributed lag bounds test was performed. Moreover, the short-term relationship between the variables was examined with the vector error correction model (VECM). Accordingly,

the results of the autoregressive distributed lag bounds test for short and long term coefficient estimation among the variables are given in Table 4.

**Table 4.** ARDL Short and Long Term Cointegration Coefficient Estimation Results

<b>ARDL Short Term Estimation Results</b>				
Dependent Variable: VOTR – Model: (1,0,3)				
<b>Variables</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>t</b>	<b>P</b>
D(GDP)	0.129754	0.099854	1.299432	0.2086
D(INR)	0.010522	0.057596	0.182678	0.8569
D(INR(-1))	0.140785	0.072917	1.930758	0.0678***
D(INR(-2))	0.123382	0.065229	1.891528	0.0731***
C	32.331127	7.597380	4.255563	0.0004*
CointEq(-1)	-0.648556	0.153827	-4.216129	0.0004*
<b>ARDL Long Term Estimation Results</b>				
Dependent Variable: VOTR				
<b>Variables</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>t</b>	<b>P</b>
GDP	0.102325	0.216824	0.471927	0.6421
INR	-0.339903	0.029895	-11.369948	0.0000*

Note: \*, \*\* and \*\*\* represent the stationarity at the significance level of 1%, 5% and 10%, respectively

According to the autoregressive distributed lag bounds test results in Table 4, the CointEq(-1) error correction variable coefficient is negative (-0.648556) and statistically significant (0.0004). In addition, according to the results of the short-term analysis in Table 4, the effect of the per capita gross domestic product rate on the vote rate was found to be positive and statistically insignificant. Another important finding determined according to the results of the short-term analysis is that the one and two-term lag value of the inflation rate has a negative and statistically significant effect on the vote. According to the long-term results of the autoregressive distributed lag bounds test in Table 4, the effect of the per capita gross domestic product rate on the vote rate was found to be positive and statistically insignificant, while the effect of the inflation rate on the vote was found to be negative and statistically significant. A 1% increase in the inflation rate decreases the vote rate by -0.339%. According to the test results, it was determined that the variable that affects the voter preference most and statistically significantly is inflation. As a result of the analysis, it was determined that voters could punish the ruling party with their votes at the ballot box due to an increase in inflation.

#### 4.5. Toda-Yamamoto Causality Test Results

In the current study, the Toda-Yamamoto causality test was used to determine the causality relationship between the vote rate and the per capita gross domestic product and inflation variables. The results of the Toda-Yamamoto causality test are given in Table 5. As can be seen in Table 5, while no causality relationship was determined from gross domestic product per capita to vote rate, a one-way causality relationship from inflation rate to vote rate was determined.

**Table 5.** Toda-Yamamoto Causality Test Results

<b>Dependent Variable</b>	<b>VOTR</b>	<b>GDP</b>	<b>INR</b>
VOTR	-	1.011 (0.6032)	13.153* (0.0014)
GDP	0.129 (0.9374)	-	0.9374 (0.8321)
INR	0.933 (0.6271)	2.455 (0.2930)	-

Note: \*, \*\* and \*\*\* represent the stationarity at the significance level of 1%, 5% and 10%, respectively

## RESULTS

Within the scope of political marketing, determining the factors affecting voter behaviour in today's world is of great importance for political parties and party leaders. Voters decide which political party or leader to support on the basis of their personal needs. In this connection, one of the most important factors is economic factors. Voters carefully follow the economic changes that directly affect their quality of life, and accordingly, they decide by evaluating the economic performance of the ruling party.

The past economic performance of the ruling party is an important factor that may cause voters to change their voting preferences. In this direction, voters make decisions for future by evaluating the past economic performance of the ruling party on the basis of their personal needs. While voters reward the ruling party with their votes in the ballot box in the face of positive economic developments, they hold the ruling party responsible for negative developments and punish them with their votes at the ballot box. While voters react weakly to positive economic developments, they react strongly to negative economic developments.

In the current study, the relationship between the vote rate, inflation and per capita gross domestic product in Turkey was examined using the data between the years 1990 and 2019 through the cointegration test based on the autoregressive distributed lag bounds test and the Toda-Yamamoto causality test. As a result of the analysis, a positive and insignificant relationship was found between the vote rate and the gross domestic product per capita in the short term, while a negative and statistically significant relationship was found between the vote rate and the first and second lagged values of the inflation rate.

In addition, as a result of the analyses made, it was determined that the gross domestic product per capita has a positive effect on the vote rate in the long term, but it is statistically insignificant. The reason for this is that voters continue to support the ruling party in the face of economic growth, but its effect on the votes of the ruling party is weak and the increasing welfare level after the positive economic developments in the country is not reflected to all voters at the same time and equally.

On the other hand, another important long-term finding of the current study is that the inflation rate affects the vote rate negatively and this effect is statistically significant. Voters react more strongly to negative economic indicators than to positive economic indicators. The economic problems that arise due to the negative developments in the inflation rate cause the quality of life of many people to be affected simultaneously and directly. These findings of the current study concur with the findings reported by Arcelus and Meltzer (1975), Kim and Fording (2001), Çınar (2010), Ercins (2007), Akgün (1999), Akarca and Tansel (2006) and Çarkoğlu (1997).

In addition, according to the results of the causality test, a one-way causality relationship was determined between the inflation rate and the vote rate. It is seen that the inflation rate is a reason for changing vote preferences, that is, the vote rates of the ruling parties in Turkey can be significantly affected by inflation. All the analyses show that the economic voting theory continues to be valid in Turkey. It is seen that Turkish voters remain positive but unresponsive in the face of good economic performance, but punish political parties with their votes at the ballot box in the face of negative economic performance.

It is recommended that political parties and party leaders create election manifestos and promises in their election campaigns within the scope of political marketing, taking into account the negative effect of the inflation rate on the vote rate and the causal relationship between the inflation rate and the vote rate. In addition, within the scope of political marketing in Turkey, it was determined as a result of the analyses that political parties and policymakers in the current government can maintain or increase their current votes with their inflation reducing economic policies. In this context, political parties and party leaders should frequently express their solution proposals regarding economic factors and develop positive policies in this direction within the scope of political marketing.

In addition, as a result of this study, it was determined that voters make their political decisions by considering the economic factors. In this respect, political parties or candidates should consider economic factors as well as ideological concerns in their activities within the scope of political marketing. In addition, political parties should take into account the economic factors while creating their party programs that have an effect on the preferences of the voters, and they should include the solution proposals they have developed in this direction. Solution proposals for the economic problems developed and included in the party program should be conveyed to voters in the target audience by means of mass media, which is one of the political marketing elements, and thus, they should be informed.

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