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MACROECONOMİC EFFECTS OF COVİD-19 ON TURKİSH REAL ESTATE MARKET

COVİD-19'UN TÜRKİYE GAYRİMENKUL PİYASASINA MAKROEKONOMİK ETKİLERİ

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Özet

Bu çalışma, Türkiye Cumhuriyeti'nde yatırım için ikinci en önemli sektör olan gayrimenkul piyasasının ekonomik durumunu değerlendirmektedir. Çalışmanın amacı, COVID-19 döneminde Türk emlak piyasası üzerindeki makroekonomik etkileri araştırmaktır. Bu arada, tamamen veya kısmen sokağa çıkma yasağı, sanayi kapatmaları, seyahat yasakları ve sınırların kapatılması, üretim ve tüketimi neredeyse felç eden ve etkinlik penceresindeki ekonomik krize katkıda bulunan en sert politikalar arasında yer alıyor.

Bu çalışma, COVID-19'un Türkiye Emlak Piyasası üzerindeki makroekonomik etkilerini incelemektedir. Bu makroekonomik değişkenler, konut faiz oranını ve gayrimenkul konut satışlarındaki toplam ihracatı içerir. Bu çalışma, Ocak 2018'den Eylül 2021'e kadar uzanan aylık bir veri seti kullanmaktadır. Veriler, COVID-19 öncesi ve sırasında olmak üzere iki modele ayrılmıştır. Regresyon değerlendirmesi, çoklu doğrusal regresyon modeli (MLR) kullanılarak yapılacaktır.

Elde edilen bulgulara göre ihracat her iki modelde de konut satışları ile pozitif ilişkilidir. Öte yandan, faiz konut satışları ile negatif ilişkilidir. COVID-19 dönemini içeren modelde ihracatın olumlu etkisi azalmaktadır. Aynı şekilde COVID-19 döneminde reel faiz oranlarının olumsuz etkisi arttı. Bu nedenle her iki hipotez de kabul edilmiştir..

Anahtar Kelimeler: Konut Satışları, Konut Faiz Oranları, Toplam İhracat, COVID-19.

Abstract

This study assesses the economic situation of the real estate market, which is the second most important sector for investment in the Republic of Turkey. The purpose of the study is to investigate macroeconomic effects on the Turkish real estate market during COVID-19. Meanwhile, entire or partial lockdowns, industrial closures, travel bans, and border closures are among the harshest policies that have nearly paralyzed production and consumption, contributing to the economic crisis during the event window.

This study examines the macroeconomic effects of COVID-19 on the Turkish Real Estate Market. These macroeconomic variables include the house interest rate and aggregate exports on real estate house sales. This study employs a monthly dataset that extends from January 2018 to September 2021. The data were divided into two models before and during COVID-19. The regression assessment will be done using a multiple linear regression model (MLR).

According to the findings, exports are positively associated with home sales in both models. On the other hand, interest is negatively related to house sales. The positive effect of exports is decreasing in the model that includes the COVID-19 period. Likewise, the negative

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effect of real interest rates increased in the COVID-19 period. Therefore, both hypotheses were accepted.

Keywords: House Sales, House Interest Rates, Aggregate Exports, COVID-19.

1. INTRODUCTION

This study aims to examine factors related to the Turkish real estate sector and a brief assessment of some macroeconomic factors such as the interest rate, aggregate exports, they affect directly sales operation of the existing real state sector in general during the COVID-19, especially at the first and second wave of crisis.

In 2019, the global economy was suffering from depression, high prices, and a new world war in the spirit of the times, particularly between the United States and China, which took a variety of forms, from punishments to political and diplomatic pressure to indirect military conflicts in international crises (Lippert & Perthes, 2020). All of these variables have made global economic situations more complicated to forecast in the future. The economic risks grew as a result of entering COVID-19.

The study objective of this study is to see how COVID-19 affects the increases or decreases of macroeconomic variables in Turkey's real estate market. This study consisted of two models before the COVID-19 pandemic and one during the COVID-19. To compare the two periods, the effect of the COVID-19 pandemic on house interest rates and aggregate exports was estimated by multiple line regression which is a parametric analysis method.

1.1. Research questions and hypotheses

The study question of this study is to see how COVID-19 affects the increases or decreases of macroeconomic variables in the Turkish real estate market. Despite the macroeconomic influences, is the Turkish real estate market rising or declining?

The hypotheses study will focus on the positive and negative effects of the variables and will have two key hypotheses.

H_1: Covid-19 reduces the positive effect of exports on home sales in the Turkish real estate market.

H_2: Covid-19 increases the negative effect of the house interest rate on house sales in the Turkish real estate market.

The remainder of this study is organized as follows. the second part, Section 2; investigates literature reviews studies and an overview of the Turkish real estate market during COVID-19.

Section 3; data and model variables, testing the hypothesis, MLR models, econometric tests and an overview of finding. Section 4; Conclusions.

2. LITERATURE REVIEW

The relationship between macroeconomic variables and the worldwide real estate market has been extensively studied in the literature. The majority of this research focused on both developed and developing countries. The aim of this study is to evaluate key research on the relationship between macroeconomic variables and the real estate market. There are thus a lot of studies of interest rate effects compared to studies of the effect of exports on the real estate market.

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Abul (2020) investigates the short-run and long-run dynamic links between Kuwait's real estate market and four macroeconomic factors. Money supply, the Kuwait Stock Exchange's Kuwait Core Market Index, the one-month interest rate on deposits, and oil prices are among the macroeconomic variables. The data utilized in this study was collected on a monthly basis from 2010 to 2018. Using the ECM and the ARDL model, the interest rate, on the other hand, has a negative association with the real estate market in the long run. Long-run causation between Kuwait's real estate market and money supply, oil prices, and interest rates have been established. Alhodiry et al. (2021) Turkey's real estate market was put to the test by oil prices and the US interest rate. The ARDL model was used to build a monthly dataset that covers the period August 2009 to August 2018. Oil prices have a favourable impact on the Turkish real estate market, according to the research. The findings show that the domestic interest rate has a major impact on Turkey's real estate market. Furthermore, the findings revealed that, via oil prices and domestic interest rates, US interest rates have a large beneficial impact on Turkey's real estate market. Sari et al. (2007) The relationship between housing starts and macroeconomic variables in Turkey between 1961 and 2000 is examined in this paper. The generalized variance decomposition method is used to investigate the relationships between housing market activity and prices, interest rates, production, money supply, and employment. The findings suggest that the monetary aggregate has a larger and more significant impact on home investment than does employment. Interest rate, output, and price shocks all have an impact on the Turkish housing market in general.

Ozkan (2018) The impact of macroeconomic variables on T-REITs is investigated in this study. Stock exchange, inflation, industrial output, exchange rate, interest rate, and consumer confidence are the macroeconomic factors studied. Between 2005 and 2017, they used both VAR and VECM models in their research. T-REITs' return and interest rates applied for housing loans and the consumer confidence index, which runs from T-REITs' return to interest rates applied for housing loans and the consumer confidence index, and T-REITs' return and the consumer price index, which runs from consumer price index to T-REITs' return, were found to have unidirectional causality. In addition, there is a bi-directional correlation between T-REIT returns and consumer price indexes and interest rates, which is known as Granger causality. Yildirim and Ivrendi's (2017) study uses structural vector autoregressive (SVAR) models to look at the dynamic link between house prices, income, interest rates, housing permits, and stock prices in Turkey from 2003 to 2016. The findings demonstrate that the variables have statistically significant and considerable connections. The analysis also reveals that housing market indicators such as home prices and housing permits are extremely sensitive to monetary policy and income shocks. The element that has the greatest impact on property values is a change in mortgage rates. In Turkey, the property market also plays an essential role in conveying monetary policy to the real economy, according to the study.

Yasin (2019) study examined how macroeconomic factors affect property prices in Turkey's three main cities: Istanbul, Ankara, and Izmir. Co-integration tests, cause-effect correlations, variance analyses, and panel analyses were all used in the study. Between January 2010 and December 2018, the research was carried out Interest rates are discussed as a driving element behind the demand for real estate among the local populace. The demand for real estate has been studied, particularly in these three areas. The currency rate and oil prices, which are

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introduced to the study by taking into consideration the input prices affecting real estate supply, are the other components. This demonstrates that in Ankara and Izmir, interest rates are more effective than FX rates, however, in Istanbul, the FX rate has a greater impact on property prices. Hameed et al. (2012) Using real exports, real GDP, and real terms of trade, this article explores the causality between exports and economic growth in Pakistan using the econometric technique Granger causality. Between 1960 and 2009, data was acquired. The empirical results of the Granger causality technique clearly show that in Pakistan, there is a unidirectional correlation from GDP to exports, but not the other way around.

2.1. Overview of Turkish real estate market during COVID_19

Since January 2013, the Central Bank of Turkey has reported total residential sales in Turkey monthly. The average number of home sales in Turkey before COVID-19 was 108,362, which was in line with the sector's long-term average. Residential sales have changed from the long-term trend in response to economic changes. Investors are looking for long-term income that will provide them with monthly income as well as a profit from the asset's increased value when they exit. (Camlibel et al., 2021).

According to Kaynak et al. (2021), although there have been two major boom and bust periods in recent years, after the harmful effect of increasing mortgage loans following the economic slowdown and foreign exchange crisis that began in August 2008 in Turkey, residential sales dropped to the long-term average in January 2019 and reached the lowest point of 61,555 in June 2019 (historic low before COVID-19). Residential sales rose over the long-term average in August 2019 with 110.538 sales and peaked in December 2019 with 202.074 sales, (TURKSTAT,2019) the highest figure for the pre-COVID-19 period. Before COVID-19, the residential sector was expanding, resulting in lower inflation and mortgage rates, increased economic activity, and improved expectations.

The Republic of Turkey's Ministry of Health announced the first COVID-19 case on March 11, 2020. The COVID-19 had a severe impact on the Turkish residential real estate market due to the adverse effects of health concerns, stay-at-home orders, and economic uncertainty. As a result, residential sales fell to 118.753 in February and 108.670 in March, and to a record low of 42.783 in April and 50.936 in May COVID-19 recession period (TURKSTAT.2020).

Due to the epidemic, the government's monetary policy has lowered the political interest rate to 8.25% to support the pandemic recovery (TCMB). Furthermore, on June 1st, the Turkish government unveiled a loan package to help the economy, which resulted in increased borrowing. Thanks to supportive mortgage loan packages, home sales in Turkey reached a new high of 190.012 in June and 229.357 in July (TURKSTAT, 2020). We called these two months the "growth period" of the mortgage loan package, resulting in minimizing the impact of COVID-19 on the real estate market (Kaynak et al. 2021). Figure 1 shows you the decrease and increases in house sales during the first wave of COVID-19.

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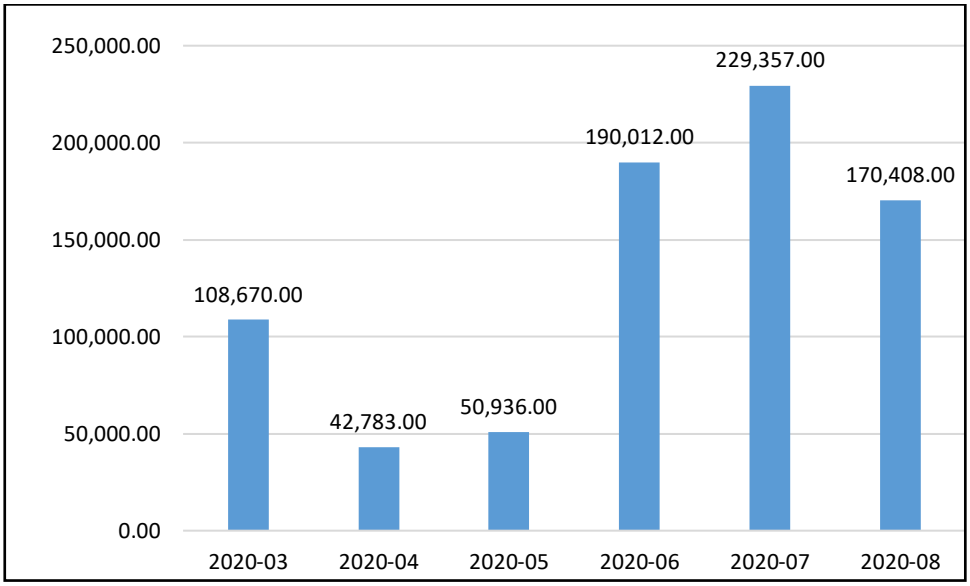
Figure 1: shows the number of house sales, March-August 2020



Source: (TURKSTAT, 2020).

Investments in Real Estate from Around the World Increased cross-border real estate investments, international development projects, multinational real estate ventures, and integrated township/housing developments are now compensating for the lack of "international trade" in real estate, not just in traditionally warm and inviting markets, but increasingly in developing world markets (Bardhan & Kroll, 2007).

In recent decades the international trade before the Covıd-19 crisis, Turkey has undergone several significant reforms, including ensuring the central bank's operational independence strengthening the banking industry and financial market, as well as removing all capital inflow limitations. As a result of these reforms, foreign trade has climbed from 18 % of GDP in 1981 to 61 % in 2018, and overall exports have increased from 2.9 billion USD in 1981 to 177.5 billion USD in 2018. (Alhodiry et al., 2021) however, during the pandemic crisis Exports decreased by 6.3% and imports increased by 4.3% in January-December 2020, exports were 169.5 billion (TURKSTAT,2020).

3. METHODOLOGY, MODEL CONSTRUCTION and ANALYSIS

3.1. Data and model variables.

This paper employs a monthly dataset that extended from January 2018 to September 2021. The data is gathered through secondary data that entail examining previously collected statistical data. The data is gathered from the Turkish Statistics Institute (TURKSTAT), the General Directorate of Title Deed and Land Registry (TKGM), Republic of Turkey's Central Bank (TCMB) and the Republic of Turkey Ministry of Trade.

The main hypotheses of the research are that macroeconomic influences through house interest rates and aggregate exports (independent variables) on the Turkish real estate market's house sales (dependent variable). The analysis of the data will be carried out using EViews12, mainly for time-series oriented econometric analysis. A logarithmic transformation is applied to the variables so that you can interpret the coefficients. To come up with the regression model

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showing the relationship that exists between house sales (dependent variable) and the macro-economic factors of house interest rates and aggregate exports (independent variable).

The regression assessment will be done using multiple linear regression (MLR)The variables under our study are house sales, house interest rate, and aggregate export. The data was split into two groups: before COVID-19 and during COVID-19; the first group was from January 2018 to February 2020, and the second group was from January 2018 to September 2021.

I. Model from 2018m01 to 2020m 02
II. Model from 2018m01 to 2021m 09

the main equation in this article can be checked as follows:

$$\log Y = C + \log \beta_1 + \log \beta_2 + \epsilon$$

$\log Y$= logarithm of house sales

Log β_1 = logarithm of house interest rates

log β_2 = logarithm of aggregate exports

ϵ = is the error of the regression model.

3.3 Testing the Hypothesis

3.3.1 Unit Root Test

Unit root tests are used to test the stationarity of the series. There are a variety of unit root tests, each of which is based on a different set of assumptions and yields different findings. One of the most well-known and extensively utilized tests among them is the Augmented Dickey-Fuller (ADF) test (Herranz, 2017).

In this study, unit root tests are performed with the Augmented Dickey-Fuller (ADF) tests. The information criterion Schwarz information criterion (SIC) is chosen. The stationarity tests of the series are performed and reported in Table 1. I. Model from 2018m01 to 2020m 02 (before COVID-19), Table 2. II. Model from 2018m01 to 2021m 09(during COVID-19) As seen in both tables, the series become equally stationary at the first and second difference. Therefore, series are used in I. model (-2) and II. model (-1) in the Multilinear Regression Model.

Table 1. ADF unit root test results 2018m01-2020m02

Variables	Intercept		Trend and Intercept		None	
	P-value	P- value	P-value	P- value	P-value	P-value
$\log Y$ (0)	-3.451	0.0185	-3.479	0.0637	-0.0637	0.7309
$\log Y$ (1)	-8.118	0.0000	-7.938	0.0000	-8.288	0.0000
$\log Y$ (2)	-6.906	0.0000	-6.765	0.0001	-7.064	0.0000
Log β_1 (0)	-1.608	0.4631	-1.778	0.6832	-0.423	0.5197
Log β_1 (1)	-2.984	0.0507	-3.126	0.1230	-3.035	0.0040
Log β_1 (2)	-5.278	0.0003	-5.151	0.0021	-5.403	0.0000
log β_2 (0)	-4.001	0.006	-4.531	0.0083	0.608	0.8394
log β_2 (1)	-9.096	0.0024	-4.302	0.0147	-4.541	0.0001
log β_2 (2)	-4.763	0.0018	-4.511	0.0121	-4.924	0.0001

footnotes significance at 5%.

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Table 2. ADF unit root test results 2018m01-2021m09

Variables	Intercept		Trend and Intercept		None	
	P-value	P value	P-value	P value	P-value	P value
$\log Y(0)$	-4.37	0.0011	4.322	0.0069	0.057	0.6958
$\log Y(1)$	-7.81	0.0000	-7.717	0.0000	-7.898	0.0000
$\log Y(2)$	-8.82	0.0000	-8.70	0.0000	-8.93	0.0000
Log β_1 (0)	-2.298	0.1771	-1.875	0.6495	0.030	0.6869
Log β_1 (1)	-4.285	0.0015	-4.230	0.0091	-4.332	0.0001
Log β_1 (2)	-6.101	0.0000	-6.020	0.0001	-6.181	0.0000
log β_2 (0)	-3.321	0.0198	-3.645	6.0372	0.543	0.8296
log β_2 (1)	-9.184	0.0000	-9.101	0.0000	-9.243	0.0000
log β_2 (2)	-7.078	0.0000	-6.990	0.0000	-7.172	0.0000

footnotes significance at 5%.

3.3.2 Multiple Linear Regression Model

In the second place the multiple linear regression model (MLR)the estimation method least squares (LS)

I. Model from 2018m01 to 2020m 02 (Before COVID-19)

II. Model from 2018m01 to 2021m 09(During COVID-19)

In the multiple-liner regression model in linear regression, only two continuous variables can be utilized: an independent variable and a dependent variable. The parameter that is utilized to calculate the dependent variable or outcome, is known as the independent variable. Several explanatory variables are included in a multiple regression model (Hayes,2022). Coefficient of Regression The regression coefficients are the parameters' least-squares estimations. When the remaining X's are fixed, the value reflects how much change in Y occurs for a one-unit change in x.

Empirical test**:** Table 3. Represent I. Model at the level difference (-2) the estimate equation:

$$\log Y = C + \log \beta_1 + \log \beta_2 + \epsilon$$

$$\log Y = -4.02 - 0{,}37 \log \beta_1 + 1.32 \log \beta_2$$

Table 4. represent II. Model at the level difference (-1) the estimated equation:

$$\log Y = C + \log \beta_1 + \log \beta_2 + \epsilon$$

$$\log Y = -3.43 - 0.55 \log \beta_1 + 1.27 \log \beta_2$$

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Table 3. Dependent Variable: $\log Y$ (-2)
Method: Least Squares
Sample (adjusted):2018M03 2020M02

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\log \beta_1$ (-2)	-0.379872	0.155823	-2.437837	0.0238
$\log \beta_2$ (-2)	1.329591	0.472161	2.815968	0.0104
C	-4.02005	3.382464	-1.188498	0.2479
R-squared	0.386504	mean dependent var		5.040417
Adjusted R-squared	0.328076	S.D dependent var		0.112732
S.E of regression	0.092408	Akaike info criterion		-1.808757
Sum squared resid	0.179322	Schwarz criterion		-1.661490
log likelihood	24.70496	Hannan-Quinn criter.		-1.769680
F-statistic	6.615022	Durbin-Watson stat		1.261823
Prob. (F-statistic)	0.005916			

Footnote: If the p-value is less than alpha, say 0.05, the null hypothesis of equality is rejected. This p-value is for a two-tail test.

Table 4. Dependent Variable: $\log Y$ (-1)
Method: Least Squares
Sample (adjusted):2018M02 2021M09

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\log \beta_1$ (-1)	-0.554706	0.153153	-3.62191	0.0008
$\log \beta_2$ (-1)	1.274007	0.287073	4.437916	0.0001
C	-3.438965	2.006502	-1.71391	0.0941
R-squared	0.377642	mean dependent var		5.034545
Adjusted R-squared	0.347203	S.D dependent var		0.146834
S.E of regression	0.118629	Akaike info criterion		-1.35989
Sum squared resid	0.576983	Schwarz criterion		-1.23824
log likelihood	32.91762	Hannan-Quinn criter.		-1.31478
F-statistic	12.43922	Durbin-Watson stat		1.007799
Prob. (F-statistic)	0.00005			

Footnote: If the p-value is less than alpha, say 0.05, the null hypothesis of equality is rejected. This p-value is for a two-tail test.

3.3.3 Econometric Methodology for approved research models

a) Normality test

Normality tests are used to examine whether a data collection is well-modelled by a normal distribution and to calculate the probability that a random variable underlying the data set is normally distributed. By examining the shape of a probability histogram, you may determine whether it is normal. You may usually assume normalcy if the graph is roughly bell-shaped and symmetric about the mean (Das, 2016).

As represented in Table 5. Both models' tests show high p-values of 0.05. The models follow the normal distribution.

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b) The Breusch- Pagan Heteroscedasticity test

The Breusch-Pagan Heteroscedasticity test is used to check for heteroscedasticity in a linear regression model. It assumes that the error components are normally distributed. It determines if the values of the independent variables affect the variance of regression errors. (Hoogerheide & Borowska,2017). The chi-squared test yields a p-value, and if the p-value is less than 0.05, the null hypothesis is rejected. The null hypothesis in this scenario is homoscedasticity, which would be rejected.

As represented in Table 5. Both model tests show high p-values of 0.05, suggesting that we cannot reject the null hypothesis that the residuals are homoscedastic.

c) Autocorrelation test Breusch-Godfrey Serial Correlation LM

An autocorrelation test refers to the degree of correlation between two-time intervals of the same variables and is often used by financial analysts. However, there is no correlation if the serial correlation of a variable is zero, and each observation is independent of the others. If the serial correlation of a variable skews toward one, the observations are serially correlated, and future observations are influenced by previous values (Lee, 2014).

As represented in Table 5. In this test the p-value of the test is higher than some significance level $\alpha = 0.05$ then we accept the null hypothesis and conclude that are serially correlated

According to table 5, both models, I. Model from 2018m01 to 2020m02 (before COVID-19),

II. Model from 2018m01 to 2021m09 (during COVID-19). There aren't any econometric issues.

Table 5. Econometric Tests Outputs

Test type	I. Model P-value	II. Model P-value
Normality test	0.3459	0.8854
Heteroscedasticity test	0.1651	0.4748
Autocorrelation test	0.1501	0.0647

footnote: P-value show higher than 0.05

d) Variance Inflation Factors (VIF)

VIFs are used to determine the level of collinearity between regressors in an equation. They show how much a regressor's coefficient estimate variance has been exaggerated. VIFs are created by dividing a coefficient's variance by its other values. There are two types of variance inflation factors: centered and uncentered. The centered VIF is calculated by dividing the variance of the coefficient estimate from the original equation by the variance of the coefficient estimate using only that regressor and a constant. If your original equation did not have a constant, only the uncentered VIF will be presented (EViews.com).

The following is a general rule for understanding the variance inflation factor: 1 indicates that there is no correlation. Moderately correlated is defined as a score between 1 and 5. highly connected if the number is greater than 5.

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According to table 6 and table 7, in both models, the VIF for both models is moderately correlated with the centered VIF.

Table 6. Variance Inflation Factors(VIF)
Sample : 2018m01 2020m02

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
$\log \beta_1$(-2)	0.024281	107.9173	1.00242
$\log \beta_2$ (-2)	0.222936	32231.54	1.00242
C	11.44106	32156.03	NA

footnote: VIF show less than 5

Table 7. Variance Inflation Factors(VIF)
Sample : 2018m01 2021m09

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
$\log \beta_1$(-1)	0.023456	108.0538	1.124100
$\log \beta_2$ (-1)	0.082411	13272.72	1.124100
C	4.026051	12587.89	NA

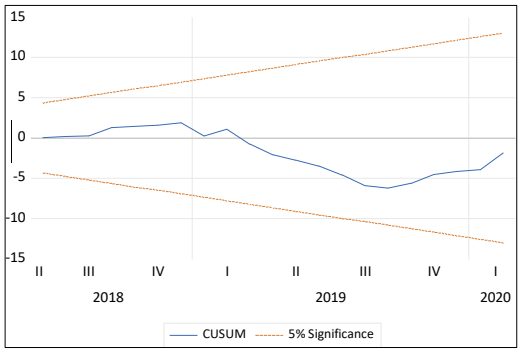
footnotes: VIF show less than 5

e) Stability Test (CUSUM)

The CUSUM test uses the cumulative sum of the recursive residuals (Brown, Durbin, and Evans, 1975). Brown, Durbin, and Evans' CUSUM test determine the stability of regression relationships over time by using an alternative estimate for the variance of disturbances in the regression(Kramer,1986). The cumulative sum is presented along with the 5% crucial lines in this option. The test results show that both models are stables.

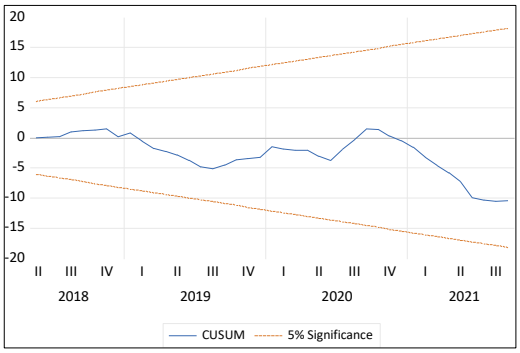
The model appears to be well specified, based on the results of the reset test. In addition, both models Figures 2 and 3 demonstrate that the CUSUM chart indicates that the model in this article is not misspecified and that the model has not changed structurally over the period studied.

Figure 2: I. Model from 2018m01 to 2020m02



Stability test using (CUSUM)

Figure 3: II. Model from 2018m01 to 2021m09



Stability test using (CUSUM)

3.3.4 An Overview of the Findings

As indicated in table 8, secondary data were examined and analyzed using multiple linear regressions, with two models being generated and compared between the two models. The hypothesis was as follows:

H_1: Covid-19 reduces the positive effect of exports on home sales in the Turkish real estate market.

H_2: Covid-19 increases the negative effect of the house interest rate on house sales in the Turkish real estate market.

Table 8. Comparison of two models

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Model	Independent Variables		
	C	$\log \beta_1$	$\log \beta_2$
I. Model $\log Y$ (-2)	-4.02	-0.37	1.32
II. Model $\log Y$ (-1)	-3.43	-0.55	1.27

4. CONCLUSION

The purpose of this study is to see how COVID-19 affects the increase or decrease and to reveal the positive and negative effects of macroeconomic variables in Turkey's real estate market. The study investigated the effect of COVID-19 on house interest rates and aggregate exports (independent variables) on house sales (dependent variables) in the Turkish real estate market.

Additionally, a logarithmic transformation was applied to the variables to interpret the coefficients. The results were analyzed using multiple linear regression implemented by EViews12. Moreover, econometrics tests were used to analyze the relationships between variables, normality, heteroscedasticity, autocorrelation, variance inflation factors, and stability tests (CUSUM). The results from the models are interpretable, and no econometric problems were found. Also, the study applied two models and, consequently, compared the two periods.

I.Model from 2018m01 to 2020m02 (before COVID-19)

$$\log Y\,(-2) = -4.02 - 0{,}37 \log \beta_1\,(-2) + 1.32 \log \beta_2\,(-2)$$

II. Model from 2018m01 to 2021m09 (during COVID-19)

$$\log Y\,(-1) = -3.43 - 0.55 \log \beta_1\,(-1) + 1.27 \log \beta_2\,(-1)$$

In the final analysis, it was found that the logarithm of house interest rates had a negative increase during COVED-19. The coefficient is higher at -0.55 compared to the pre-COVED-19 coefficient of -0.37 effect on house sales. On the contrary, the logarithm of aggregate exports shows a positive decrease during COVID-19. The coefficient is lower at 1.27 compared to the 1.32 effect on house sales before the COVID-19. The decrease of one unit from international export leads to a decrease in house sales of 1.27, vice versa. Thus, the increase of one unit in the house interest rate decreases house sales by 0.55 and vice versa.

In conclusion both models, exports are positively associated with home sales. On the other hand, interest is negatively related to house sales. In the model that includes the Covid-19 period, the positive effect of exports is decreasing. Likewise, the negative effect of real interest rates increases in the Covid-19 period. Besides, the results showed that the house interest rate coefficient is negatively and statistically significant. Thus, any decline in interest rates leads to an increase in house sales. Furthermore, the aggregate trade coefficient is positive and statistically significant. Thus, any increase in international trade leads to an increase in house sales. Therefore, both hypotheses were accepted.

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