T.C.
ISTANBUL AYDIN UNIVERSITY
INSTITUTE OF GRADUATE STUDIES

**MACROECONOMIC EFFECTS OF COVID-19 ON THE TURKISH REAL
ESTATE MARKET**

MASTER`S THESIS

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Department of Business
Business Administration Program

July 2022

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JULY 2022

ONAY FORMU

DECLARATION

I hereby declare with the respect that the study "Macroeconomic Effects of Covid-19 on the Turkish Real Estate Market", which I submitted as a Master thesis, is written without any assistance in violation of scientific ethics and traditions in all the processes from the project phase to the conclusion of the thesis and that the works I have benefited are from those shown in the Bibliography. (.../.../20...)

DİANA ZOGHAYYER

FOREWORD

First and foremost, I would like to express my gratitude to the Almighty Allah for his abundant mercy and protection, which allowed me to complete my dissertation.

I am grateful because, without Dr Tayfun Tuncay Tosun's help, I would not have been able to finish my dissertation. Thank you so much, I appreciate your dedication and step-by-step advice for me. I would like to express my gratitude to everyone at Istanbul Aydin University.

Especial grateful to my father who makes me proud to have such a wonderful and supportive father as you, and my loving mother, thank you, my family and friends.

JULY 2022   DIANA ZOGHAYYER

MACROECONOMIC EFFECTS OF COVID-19 ON THE
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ABSTRACT

This study investigated the relationships between house sales and macroeconomic variables such as housing interest rate, inflation, exchange rate, aggregate exports, and industrial production in Turkey using the multiple linear regression model. In order to detect the effects of Covid-19, monthly data are divided into two groups pre-Covid-19 (2018M1-2020M2) and during the Covid-19 period (2020M3-2021M9) and two different models are formulated. The findings of the study are summarized as follows: (i) Inflation, exchange rate, and industrial production variables are excluded from both models as they are statistically insignificant and caused deviations in the assumptions of the multilinear regression model. (ii) It is found that aggregate exports in Turkey are positively related to housing sales, while house interest is negatively related to house sales. (iii) It is discovered that the negative effect of housing interest rates enhanced during the Covid-19 period. (iv) On the other hand, it is uncovered that the positive effect of aggregate exports decrease during the Covid-19 period. These findings strengthen the importance of increasing the competitiveness of Turkish companies by developing the production of high-tech products. This factor will increase the export rate of the country and contribute to the decrease in interest rates.

COVİD-19 SALGINI'NIN TÜRKİYE EMLAK PİYASASINA MAKROEKONOMİK ETKİLERİ

ÖZET

Bu çalışma, Türkiye'de çoklu doğrusal regresyon modelini kullanarak konut satışları ile konut faiz oranı, enflasyon, döviz kuru, toplam ihracat ve sanayi üretimi gibi makro ekonomik değişkenler arasındaki ilişkileri araştırmıştır. Covid-19'un etkilerini tespit etmek için aylık veriler, Covid-19 öncesi (2018M1-2020M2) ve Covid-19 sürecinde (2020M3-2021M9) olmak üzere iki gruba ayrılarak iki farklı model oluşturulmuştur. Çalışmanın bulguları şu şekilde özetlenmiştir: (i) Enflasyon, döviz kuru ve sanayi üretimi değişkenleri, istatistiksel olarak anlamsız oldukları ve çok doğrusal regresyon modelinin varsayımlarında sapmalara neden oldukları için her iki modelden de atılmıştır. (ii) Türkiye'de toplam ihracatın konut satışlarıyla pozitif ilişkili olduğu, konut faizinin ise konut satışlarıyla negatif ilişkili olduğu bulunmuştur. (iii) Covid-19 döneminde konut faiz oranlarının olumsuz etkisinin arttığı tespit edilmiştir. (iv) Diğer taraftan, Covid-19 döneminde toplam ihracatın olumlu etkisinin azalmakta olduğu keşfedilmiştir. Ortaya çıkan bulgular, Türk şirketlerinin yüksek teknolojili ürünlerin üretiminde gelişerek rekabet güçlerinin artmasının önemini güçlendirmektedir. Bu faktör ülkenin ihracat oranını artırırken faiz oranlarının düşmesine katkı sağlayacaktır.

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

TABLE OF CONTENT

ABBREVIATIONS

ADF   : Augmented Dickey-Fuller.

ARDAL   : Autoregressive Distributed Lag.

ECM   : Econometric Error Correction Model.

ELG   : Export-Led Growth.

EMEs   : Europe and Middle East Section.

EU   : European Union

FAVAR   : Factor-Augmented Vector Autoregression Model

FDI   : Foreign Direct Investment.

FX   : Foreign Exchange

H-REITs   : Honk Kong Real Estate Investment Trusts.

G20   : The Group of Twenty is a Group of the World's Major Economies

GDP   : Gross Domestic Production.

MLR   : Multiple Linear Regression.

QE   : Quantitative Easing.

REITs   : Real Estate Investment Trusts.

REM   : Real Estate Market.

SIC   : Schwaz İnformation Criterion.

SPSS   : Statistical Package for the Social Sciences.

SVAR   : Structural Vector Autoregression

TCMB   : The Central Bank of the Republic of Turkey.

TKGM   : General Directorate of Title Deed and Land Registry.

TREM   : Turkish Real Estate Market.

TURKSTAT : The Turkish Statistics Institute.

T-REITs : Turkey Real Estate Investment Trusts.

UK : United Kingdom.

USA : United States of America.

US : United States.

VAR : Vector Autoregression.

VECM : Vector Error Correction Model.

WTO : The World Trade Organization

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I.   INTRODUCTION

A. Introduction

This study seeks to explore the connection between real estate house sales, housing interest rate, and aggregate exports, to show the effects of Covid-19 with the first and second waves of the Turkish real estate market (TREM). The study's purpose is to evaluate how Covid-19 affects the increases or decreases of macroeconomic variables in Turkey's real estate market.

The Covid-19 pandemic is becoming a constant part of life and work, as the World Health Organization recently revealed (Tanrıvermiş, 2020: 263). This small creature, which human eyes cannot perceive, is altering the entire universe. It affected every element of our existence, including daily life, education, commerce, the environment, and most crucially, our psychology, much more severely than the 2008 financial crisis did. Most nations have strict policies in place to shut their borders, even across cities, resulting in hits to most of the main economic sectors in the world, such as transportation, tourism, hotels, and international trade, as the trade flow demand shocks (purchases fall) and supply shocks, quite naturally (production falls), and global financial markets have also responded to the shifts and global stock indicators have plummeted (Baldwin & De Mauro, 2020: 4-73).

In 2019, the world economy was plagued by deflation, skyrocketing prices, and a new world war inspired by the times, especially between the United States and China. This war took many different forms, from direct military conflicts in times of international crisis to sanctions, political and diplomatic tension, and indirect military conflicts (Lippert & Perthes, 2020: 28). All of these elements have contributed to the complexity and difficulty of forecasting the future state of the world economy. Additionally, entering Covid-19 raised threats to the economy.

The primary and most powerful sectors of the Turkish economy are categorized as being real estate, infrastructure, tourism, and finance (Tanrıvermiş, 2020: 264). According to OECD, due to the effects of Covid-19 in March and April,

many industries declined, and all indices declined. These indicators clearly show the impact of Covid-19 on the economic confidence index fixed assets and foreign investment fell sharply in Turkey.

The Turkish real estate industry is affected by social proliferation, telecommunications, physical store closures, and strict travel restrictions. Because Turkey is testing self-extraction according to global guidelines, many companies have started working remotely. As a result, workplace strategies, including long-term telecommunications or flexible office space, are redefined with a clear focus on health and safety. The economic downturn in March 2020 was more pronounced in the property industry, and tools for fiscal policy have not changed to mitigate adverse effects (Camlibel et al., 2021: 268). Developments in the world economy and Positive statements are not permitted in Turkey. specifically, the present-day economic and social unrest have harmed the Turkish economy, and it is difficult to predict how long this situation will last.

Of course, the crisis led to an oversupply of real estate. To reduce the oversupply, the government has issued necessary regulations to provide long-term low-interest mortgages to state-owned banks, conduct online property registration, and make them flexible in public places. The private sector bans layoffs and short-term benefits during a pandemic, lowers property registration fees, and prevents financial bankruptcy, as expected in the second wave of crises, the volume of homes sold rose, however since the process's starting, people's overall attitudes toward real estate, especially housing, have changed (Kaynak et al., 2021: 626).

People's thoughts and lifestyles will change after Covid-19. Buyers' opinions will undoubtedly suffer. Secure jobs, declining wages, savings, and business volumes have disrupted real estate cash flow. On the plus side, the real estate industry reacted quickly to changes and adapted to new technologies. This is reflected in the digitization of many processes (Tanrivermiş, 2020: 268) The Covid-19 pandemic has resulted in significant changes in investment regulations, which will continue to weigh on the pandemic.

B.   Background of the Research

As cited in Alhodiry et al. (2021: 3), over the previous few decades, Turkey's housing assets have grown at a massive rate, and the real estate industry is the most valuable resource for Turkish homeowners in 2018 with a 70% housing share. The housing market's vitality is regarded as one of the most essential measures of macroeconomic performance. In addition to a share of the total GDP of 19.5 %, the housing and infrastructure sectors received 4.1 billion dollars in FDI, contributing to 24.8 percent of overall FDI. Turkey's annual price rise placed it at position 55 in the Knight Frank Global House Price Index.

Furthermore, urban renovation schemes have been undertaken in many Turkish metropolises. Over the next two decades, it appears that roughly 6.7 million housing properties will be destroyed and renovated. As a result, this is required to ensure the need for more research into the factors that affect the real estate market (Erdogan et al., 2019: 149). To entice possible overseas investors and market their properties, Turkish property developers established foreign offices. The Republic of Turkey, Qatar, Russia, Iran, Saudi Arabia, the United Arab Emirates, and Azerbaijan have all expressed strong enthusiasm for Turkish investments.

Turkey has become an attractive country due to its convenient transport, tourism and entertainment facilities, conference tourism and luxury retail malls with a variety of entertainment options and all major international brands. As of the third quarter of 2019, Turkey had over 453 retail complexes. (Goyder, 2019: 46). As a famous metropolis, Istanbul attracts attracting the interest of international investors. Istanbul is a crossroads of Europe and Asia, a real estate investment paradise, a breakout star with plenty of prospects in real estate; and a lucrative real estate paradise (Keskin, 2010: 58).

Since January 2013, Turkey's Central Bank has published a monthly report on total home sales. Before Covid-19, Turkey's average number of home sales was 108,362, which was in line with the sector's long-term norm. Yet, Residential sales have strayed from the long-term trend as a result of economic shifts. Investors seek long-term income that will offer them both a monthly income and a return from the asset's increasing value when they exit (Camlibel et al., 2021: 275).

According to Kaynak et al. (2021: 627), despite the fact that in recent years,

there have been two significant growth and crash phases, following the negative impact of increased financing houses as a result of the economic slowdown and foreign exchange crisis that began in Turkey in August 2008. In January 2019, the selling of real estate fell to the long-range average, and in June 2019, they hit a low of 61,555. (historic low before Covid-19). Residential sales increased over the long-term average in August 2019 (110.538 sales) and peaked in December 2019 (TURKSTAT, 2019), with 202.074 sales, the greatest figure for the pre-Covid-19 period. The residential sector was expanding prior to Covid-19, which led to stronger anticipation, more prosperous economic growth, and reduced inflation and borrowing rates.

On March 11, 2020, the Republic of Turkey's Ministry of Health announced the first Covid-19 case, which had a direct influence on house sales and leasing in Turkey. In terms of leasing, the outbreak is expected to depreciate investments by increasing vacancy rates in offices, shopping malls, and other sites, resulting in a loss of rental income. Actually, there is no accurate data to anticipate the distribution of office types in groups A, B, and C in the province to predict the net rental value because the local office investment database has not yet been formed (Keskin, 2010: 84). Prior to Covid-19, landowners were required to commit to longer or free occupation durations to assure appropriate occupancy and safeguard current tenants owing to office surpluses.

As for sales, Covid-19 had a severe impact on the Turkish residential real estate market due to the negative effects of health issues, remaining directives, and financial instability. As a result, residential sales fell to 118.753 in February and 108.670 in March, and to a weak rank of 42.783 in April and 50.936 in May, during the 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, 2020). Furthermore, on June 1st, the Turkish government unveiled a loan package to help the economy, which resulted in increased borrowing. Thanks to supportive packages of housing loans, 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 "evolution period" of the packages of housing loans. Turkey's GDP growth rate and currency instability remained at the same level at the end of June 2020 at 9.9% (TURKSTAT,

2020). resulting in minimizing the impact of Covid-19 on the REM, Figure 1. shows the decrease and increases in house sales during the first wave of Covid-19.
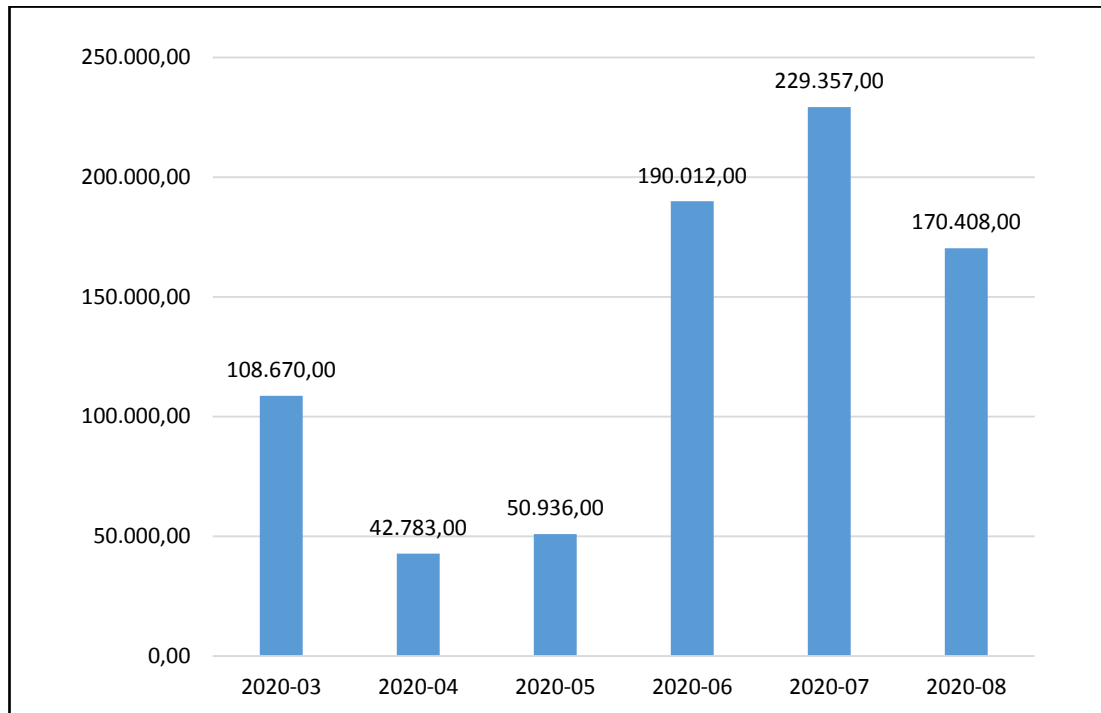
Figure 1: Number of Housing Sales (March-August 2020).

Source: TURKSTAT, 2020.

The Turkish Statistical Institute reports that in the service, commercial industry, and infrastructure sectors, respectively, the seasonally adjusted sectorial confidence index rose by 8.5 percent, 9.3 percent, and 33.1 percent month over month in June (TURKSTAT, 2020). Besides that, by effectively addressing social exclusion in the workplace and encouraging cooperation between tenants and investors, the "new normal" quickly transformed the office market into a "new path," the key to which is flexibility. Clear attention should be paid to well-being at work, as social exclusion policies can contribute to the gradual introduction of teleworking in the office-based on occupational health and safety standards, teamwork, certain tasks, and various functional tasks (Ahsan&Sadak, 2021: 10).

In addition, the new lease requires landlords to offer a more flexible lease model and provide a reasonable occupancy rate for short-range commitments. Current tenants have no long-range lease obligations and prefer short-range leases due to an inability to predict future risk factors and outcomes. This fact will become a significant impact and source of risk for both property holders and investors. To get

control of the current condition, it is necessary to expand the use of instruments such as leasing, sale and leaseback, and rental vouchers (Guden&Tunc, n.d). As a result of the crisis, office space in large cities needs to be refurbished for other purposes (e.g. hospitals, office buildings), and fundamental changes are needed to effectively use office space. Like all other industries, the real estate industry is rapidly adopting digital solutions such as Foreigners can obtain up-to-date information, legal and other relevant details, application procedures, and related responsibilities for purchasing real estate in Turkey through the General Directorate of Land Registry and Cadaster of the Ministry of Environment and Urban Planning's "Your Key Turkey" web portal, which is available in six languages (English, German, Arabic, French, Russian, and Spanish). This handbook provides foreigners with access to real estate opportunities in Turkey. (Ahsan& Sadak, 2021: 5).

Investments in Real Estate from Around the World Increased cross-border real estate investments, international development initiatives, worldwide real estate partnerships, and connected township/municipality developments are now compensating for the shortage of "international trade" in real estate, not just in traditionally warm and inviting markets, but increasingly in developing world markets (Bardhan & Kroll, 2007: 3).

In recent decades the international trade before the Covid-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 infusion of money limitations. Because of these changes, foreign trade has climbed 61 percent of GDP in 2018 compared to 18 percent in 1981, and overall exports have increased from 2.9 billion USD in 1981 to 177.5 billion dollars in 2018. (Alhodiry et al., 2021) however, throughout the epidemic Exports dropped by 6.3% between January and December 2020, while imports rose by 4.3%, and exports were 169.5 billion (TURKSTAT, 2020).

C.   The study's aims and objectives

This study seeks to explore the connection between real estate house sales, housing interest rate, and aggregate exports, to show the effects of Covid-19 on the first and second waves of the Turkish real estate market (TREM).

1. Research Questions

This study questions whether the effect of Covid-19 on house sales in the TREM can be explained by the variables of house interest rate and aggregate exports in real estate sales or not.

D. Methodology of the Research and 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), the Republic of Turkey's Central Bank (TCMB) and the Republic of Turkey Ministry of Trade.

This study aims to show the relationship between house sales (dependent variable) and the macro-economic factors of house interest rates and aggregate exports (independent variable) by using the multiple linear regression model. 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 to interpret the coefficients.

E. Hypothesis

The two hypotheses to be tested in this study are formed as follows:

H_1: Covid-19 decreases the positive effect of exports on house 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.

F. Structure of Research

This study is divided into four chapters as follows: The first chapter displays an overall introduction, and chapter 2 investigates literature reviews and theoretical frames. Chapter 3 consists of methodology, model construction, and analysis.

Chapter 4 presents the conclusion that evaluates the primary findings of the study. A rundown of the chapters is presented below:

Chapter 2: Review of Literature

- Concept Approach (interest rates, exports, COVID-19, and real estate).

- Theoretical Approach (Housing and Interest Rate Theory, Alternative Approaches to Housing Market Modeling, Empirical Literature).

- Turkish real estate market's appeal, Strategies aimed at boosting the TREM, Real estate marketing).

Chapter 3: Methodology, model construction, and analysis.

- Introduction.

- Research design.

- Research approach.

- Data collecting.

- Data analysis (testing the hypothesis, robustness tests).

- Final results.

Chapter 4: Conclusion

- Conclusion.

- Recommendations.

II.   LITERATURE REVIEW

This chapter gives the perspectives of the other writers concerning the study's research aims. The author's opinions on the study were expressed in the presentation. The relationship between macroeconomic variables and the worldwide real estate market has been extensively studied in the literature. This study seeks to investigate variables related to the TREM, as well as the assessment of some macroeconomic factors such as the interest rate and aggregate exports, which affect directly the sales operations of the existing real estate sector in general during the Covid-19. The majority of this research focused on both developed and developing countries. However, few studies have addressed how Covid-19 affects the increases or decreases of macroeconomic variables, especially in terms of exports. This research aims to close that gap in the literature.

A.   Concepts Approach

1.   Interest Rates

Abul (2020) investigated the short-run and long-run dynamic links between Kuwait's real estate market and four macroeconomic factors. In this study, Money supply, the Kuwait Stock Exchange's Kuwait Core Market Index, the one-month interest rate on deposits, and oil prices are the independent variables. The data utilized in this study was collected monthly from 2010 to 2018. Using the econometric error-correction model (ECM) and autoregressive distributed lag model (ARDL), the study discovered that the interest rate and the real estate market have a negative relationship in the long-term. In the study, long-term causality is established between Kuwait's real estate market and money supply, oil prices and interest rates.

Alhodiry et al. (2021) TREM was put to the test by fuel costs and the US mortgage rate. The ARDL model was used to build a monthly dataset that spans August 2009 through August 2018. According to the research, fuel costs have a favourable impact on the TREM. The findings show that the domestic mortgage rate has a major impact on Turkey's REM. Furthermore, the findings revealed that, via

fuel costs and domestic mortgage rates, US mortgage rates have a positive effect on Turkey's REM.

Sari et al. (2007) studied the association between macroeconomic factors and house developments between 1961 and 2000 in Turkey. The relationship between housing market action and values, mortgage rates, production, monetary policy, and occupation was examined using the generalized variance modellin approach. The findings suggested that the money supply has a greater and more important impact on home investment than employment. A mortgage rate, output, and price shocks all have an impact on the TREM overall.

Sutton et al. (2017) estimated the react of housing prices to changes in short- and long-range interest rates in 47 developed and developing economies. The complete data collected includes advanced economies and 27 emerging markets. House prices in the United States of America, other developed economies, and Europe and the Middle East section (EMEs) were all examined independently. Annual data from 1970 to 2015, a sample of quarterly housing prices, was used in the majority of regressions. The empirical results led to short-term interest rates playing a crucial effect in determining house values, particularly beyond the United States. Their opinion was that this emphasizes the relevance of the monetary policy pathway of bank lending to house price change, particularly in nations where home mortgage securitization is less common. Additionally, they found that there is a lot of price stability and that changes in mortgage rates and other factors effect property prices slowly rather than suddenly. As a result, modest policy rate reductions are unlikely to support significant house price rises. They discovered that mortgage rates in the United States appear to influence housing values in other countries.

Yildirim and Ivrendi's (2017) study uses structural vector autoregressive (SVAR) models to look at the continuous link between house prices, revenue, mortgage rates, housing contracts, and stock values in Turkey from 2003 to 2016. The analysis demonstrates that the variables have statistically significant results. It also reveals that housing market indicators such as house prices and housing contracts are extremely vulnerable to monetary policy and revenue shocks. The element that has the greatest impact on property values is a change in mortgage rates. According to the study, the property market also plays an essential role in extending the monetary policy to the real economy in Turkey.

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 relationships, variance analyses, and panel analyses were all used in the study. The research was carried out between January 2010 and December 2018, and interest rates were discussed as a driving element behind the demand for real estate among the local populace. The demand for real estate was studied, particularly in these three areas. The currency rate and oil prices, which were introduced to the study by taking into consideration the input prices affecting real estate supply, were the other components. This demonstrates that in Ankara and Izmir, interest rates were more effective than FX rates. However, in Istanbul, the FX rate had a greater impact on property prices.

According to Tem (2017), the study looked into the factors that influence residential real estate values in Turkey. From 2010 to 2016, secondary data was collected from government and financial institution publications on a monthly, quarterly, and annual basis. To summarize the essential aspects of the data in this investigation, descriptive statistics were used. Multiple regression and backward elimination were accomplished using Statistical Package for the Social Sciences (SPSS). According to the results, house prices have a strong negative association with interest rates, a weak negative relationship with inflation, a strong positive relationship with population, and a strong relationship with GDP. The results of the multiple regressions were the same, but they were statistically significant in the same way.

Ozkan (2018) investigated the influence of macroeconomic variables on Turkey's real estate investment trusts (T-REITs). The variables used in the study are stock market inflation, industrial production, currency exchange, mortgage rate, and consumer confidence. Between 2005 and 2017, these were used in both vector autoregression (VAR) and vector error correction model (VECM) models. The results were that T-REITs' returns were determined to exhibit unidirectional causality with interest rates applied to housing loans and the consumer confidence index. Furthermore, T-REIT returns have a bi-directional association with consumer price indices and interest rates, which is known as Granger causality.

2.   Export and Economic Growth

Hameed et al. (2012) used actual trade relations, real GDP, and actual exports, this study explored the correlation between exports and economic growth in Pakistan through the directional correlation data collected between 1960 and 2009. The empirical results of the directional correlation technique clearly show that in Pakistan, GDP and exports have a one-way relationship, but not the other way around.

Taban and Aktar (2008) This study applied quarterly time series data for the years 1980–2007 in Turkey to test the output economic growth, which hypothesizes a causal relationship between export and growth. Cointegration and error-correction techniques were used to evaluate the theory. They found evidence to support the claim that there is a short and long-unidirectional causative relationship between Turkey's export and economic growth.

Erol and Unal (2015) used three variables to investigate the relationship between construction investments and economic expansion in Turkey: They were actual GDP expansion, construction industry expansion, and actual interest rate. The study was conducted between 1998Q1 and 2014Q4, the sample study used quarterly data on real production-based gross domestic production series, real construction activities and real interest rate series. VAR models are used to study causal relationships, they also used the Zivot-Andrews test to identify data structure breaks. According to the results, the construction sector is more of a follower of macroeconomic fluctuations than a contributor to GDP growth. On the other hand, the sub-sample analysis shows that the causal relationship between economic expansion and building investments varies notably over the different sub-periods of the national economy. They found that the GDP has increased over the past five years as a result of the construction sector's expansion. In conclusion, given that many of the booms and busts in construction investment are caused by the sector's sensitivity to interest rates, construction has a minor impact on Turkish economic development. Construction operations have a short-term impact on economic growth and so cannot provide long-term answers to Turkey's economic problems.

Ahuja and Myrvoda (2012), this study investigated a fictitious decline in real estate investment in China that would have a significant negative economic impact,

with major knock-on effects on many of China's trading partners. A balanced panel of 390 monthly time series from the G20 economies' members makes up the data set; (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States, and the European Union), spanning the years 2000M1 to 2011M9, containing 68 China variables and 322 global variables. At least one full cycle of real estate investment and the Chinese property market was included in the sample. It used a factor-augmented VAR (FAVAR) approach to span the era when China joined the World Trade Organization WTO and grew increasingly connected with the global economy. According to the estimate, a 1 percent loss in real estate investment in China diminishes roughly 0.1 percent of China's real GDP in the first year, with negative spillover effects to China's G20 trading partners driving global output to drop by about 0.05 percent from baseline. Japan, Korea, and Germany absorb the worst of the devastation. In this scenario, commodity prices, in particular metal prices, could fall by up to 0.8–2.2 percent below their baseline one year after the shock.

According to Aslan and Topcu (2017), sectoral exports have an important impact on Turkey's economic growth. In their study, researchers collected quarterly data from 2000 to 2015, and they applied panel data to estimate empirical models. The results show that the export-led growth hypothesis is correct in the following industries:

- agriculture and forestry

- fishing

- mining and quarrying

- manufacturing

- electricity, gas, and water supply

- wholesale and retail trade

but it is incorrect in the following industries:

- real estate, renting

- business activities

- other community, social, and personal service activities

In brief, Agriculture and forestry, mining and quarrying, and manufacturing are the industries with the biggest growth contributions. In addition to the feedback hypothesis, the causality results show substantial support for an export-led growth hypothesis for four industries.

Tkalec and Vizek (2014) revealed the impact of resource reallocation from the industrial to the real estate sector on Croatian export activity. The researchers used quarterly data from 1998Q1 to 2013Q3 to test the hypothesis that the property bubble hurt the country's export competitiveness, especially for the small emerging countries, by estimating export equations using maximum likelihood and dynamic ordinary least squares estimators of serial correlation. The findings suggest that the manipulation of relative prices in favour of non-tradable sectors (construction and real estate) caused by the property bubble has limited export competitiveness. Findings also imply that deteriorating cost competitiveness and governments' inability to adopt policies that promote private sector economic development harmed export performance throughout the period studied. The research's main finding is that the expansion of a non-tradable industry in a country with a restricted supply of production elements could hurt the tradable sector's ability to raise output and compete in international markets.

Miyakoshi et. al (2020) the research looked at how quantitative easing policies in Japan, Europe United, and the United States boosted property values in Hong Kong through commerce operations and the progression of Hong Kong's real estate investment trust (H-REIT) market. The Granger-causality and impulse response studies were performed using data from the full period with ordinary-grade offices, the data were collected monthly from January 2005 to December 2016. The empirical findings revealed two new impact channels;

- The first channel revealed that Japan's QE policy influenced H-REIT pricing in the money market, resulting in a three-month delay in office prices, the route via which the H-REIT channel had a higher effect on office prices than on stock prices.

- The second channel reveals that since 2008, Japan's, the EU's, and the US's quantitative easing policies have directly shoved up office costs.

Those two new channels suggested that the QE policy split over into the real estate market as well, via the H-REIT market and carry trade. Furthermore, the empirical conclusion was stronger in the ordinary grade office pricing than in the high-grade office price, suggesting that those new channels were already well-established.

Cakici's (2015) study was done on the relationship between export volume and exchange rate. The study employed quarterly data from the World Bank and Turkish Central Bank for the years 2003 to 2013, and it used estimated regression model coefficients to analyze the data. The findings made clear the components of significant political decisions or regime changes. They will have a negative impact on how exports and exchange rates interact.

3.   COVID-19 and Real Estate

Oyedeji (2021) focused on the pandemic's impact on property sales in Nigeria's commercial hub throughout the Covid-19 pandemic, this study examined real estate transactions in Lagos by evaluating the supply, demand and sale and lease value of the property in the research region, the study also looked at the rate of real estate transactions and the issues that came up during the Covid-19 pandemic. The study's target demographic was estate surveying and valuation firms in Lagos, with 176 estate surveying and valuation firms in the sample. The information for the study was acquired between April and June utilizing questionnaires given to the participants. Comprehensive statistics, such as frequency tables, the relative relevance score, and ranking, were used to assess the data. According to the results, the Covid-19 pandemic had an impact on property supply and demand, sale value, and lease value in the studied area. In addition, the study found that the rate of real estate sales throughout Covid-19 remained constant. Most respondents who participated said the rate of real estate transactions did not alter during the epidemic compared to before it. During the pandemic, however, both supply and demand for industrial buildings (warehouses) grew. throughout the Covid-19 epidemic, the survey found that bank transaction-related issues were the most common problem in property transactions.

Allan et al. (2021) examined the current impact of Covid-19 on the Asia–Pacific region's commercial property rent dynamics, it was crucial to look at how the

Covid-19 epidemic impacted the region's real estate markets, as well as how the region had recovered since then. Using a multivariate regression technique, from 2010 to the second quarter of 2020, quarterly observations make up the sample period. Results showed According to the empirical estimate, during the first half of 2020, the Asia–Pacific commercial property market had significant rent losses of almost 15%. Also note that the most significant rent losses occur in areas with the most severe Covid-19 pandemic risk, as well as in the retail property sector, where continuing declines of over 30% have been observed, with little recovery as of the second quarter of 2020. They looked at capital values and found that, while capital targeting in the retail property sector has been modest, capital flows into the residential and industrial sectors have been observed. Government-imposed budgetary incentives have also been shown to mitigate the pandemic's negative effects.

Ahsan and Sadak (2021), studied urbanization, the housing market, and government policy interventions as a result of Covid-19 in Turkey. Covid-19 has had a significant impact on Turkey's REM, particularly the housing market in their study. Secondary data was used to examine the macroeconomic forecast, the general health of the housing market, Covid-19 cases, urbanization, and its impact on city housing markets. This study looked at first-hand and second-hand property sales, mortgage sales, development licenses, and foreign acquisitions in Turkey during the first, second, and third quarters of 2020. The fundamental predictor of the quantitative demand for housing was demographic data. The influence of urbanization was interpreted using 2019 census data in this study based on the trend of home sales in these urbanization-affected provinces and population-weighted density per square kilometer has been investigated in this regard;

- The ten densest areas (Istanbul, Ankara, Izmir, Bursa, Antalya, Adana, Konya, Şanlıurfa, Gaziantep, and Kocaeli).

- The ten less dense areas (Bayburt, Tunceli, Ardahan, Gümüshane, Artvin, Çankırı, Erzincan, Kars, Kastamonu and Sivas).

The analysis discovered that due to curfew and other Covid-19 regulated procedures, there was a significant decrease in April and May of 2020. The government's interventions, such as lower interest rates in public banks, online land

registry applications, and expansionary fiscal packages, led to a significant increase from June to the third quarter of 2020—even after taking into account Istanbul's municipalities and Turkey's ten least populous provinces, and so on. Although there was no correlation between home sales and population density in Covid-19, government policy had a significant impact on rising housing demand.

Uchehara et al. (2020) investigation's objective is to ascertain how the Covid-19 pandemic has affected both landlords and the UK real estate industry's supply chain. This study employs a qualitative descriptive research design. The necessary data was mostly collected by carefully reviewing secondary sources. Two procedural approaches were used in this empirical study method:(i) the economic recovery scenarios V, U, W, and L shapes were analyzed to establish the possible recovery pattern of supply chains across the real estate industry. (ii) was the introduction of a legislative structure to lessen the risk of pandemics across the business. The investigation's results demonstrated that the real estate chain was weak due to the impact of COVID-19 and the unpredictable nature of the economic recovery, which had been a burden for the company. Overall, this study provided insight into a risk management technique that makes use of contractual provisions as a potential means of controlling the pandemic's unpredictable long-term effects.

B. THEORETICAL APPROACH

The theoretical approach provides a theoretical foundation on which theorists have explained the causes of macroeconomics' role, especially house interest rates and aggregate exports in the housing market, particularly in house sales.

1. Kau and Keenan's Housing and Interest Rate Theory

According to Kau and Keenan's (1980) model of housing and interest rates, they used a microeconomic technique to investigate the theoretical link between actual interest rates and housing. Interest rates have a major impact on demand. They employed the suggested partial equilibrium, comparative static demand model based on partial equilibrium preference maximization with a multipored income constraint. The model operates in discrete time and was always expressed in actual prices and interest rates. As their approach, the theory of housing and interest rates became part

of general consumer theory. All markets were considered to be flawless unless otherwise stated in this theory, which was presented in a traditional framework. A smooth utility function that depends on two categories of goods—housing and other nondurables—represents consumer behaviour.

The investigation was into how interest rates affected the housing market. Housing is distinct among major consumer commodities due to its endurance. The relationship between supply and demand affects home prices. Kue and Keenan (1980) suggested that interest rates appear to have the most important influence on monetary policy. The theory was applied to the following models: (i) A model of liquid consumer durables, (ii) an interest rate and affordable rental model, (iii) the influence of shifting interest rates on investment, (iv) interest rates' effects on tenure selection, (v) the effect of changes in interest rates on mortgage payments under the right circumstances.

a. Model of liquid consumer durables

According to Kua and Keenan (1980), the consumer is aware that durables may be sold again at any time. The problem was written as u (k, c), with the budget restriction. The term (k) denotes previous expenditures on durable goods, and (c) represents the amount of consumption. They presumptively assumed that after the anticipated time frame, consumers would no longer need durables. Even though the benefit may come from the flow of services rather than the stock of a thing, knowledge of the stock is sufficient to identify the flow. They assumed the most basic and reasonable scenario, that future interest rates would remain unchanged. Only when present interest rates affect predicted future rate rises or reductions over time does the effect of interest rates on consumer durable demand become significant.

This suggests that the consumer has taken on debt in the past to be repaid with available cash in the years since wealth is to be exhausted. The revenue effect of changes in interest rates is negative since buyers of consumer durables must be net debtors. Consider treating real estate as an illiquid good that buyers expect to keep for a long time. (Artle and Varaiya, 1977). As an example of a consumer durable with high transaction costs, housing, such as heating and running water, could be difficult to value in the short term. In conclusion, the results demonstrated a negative

relationship between interest rates and the short-term demand for consumer durables.

b. An interest rate and affordable rental model

Kue and Keenan (1980) on the economics of housing showed that the impact of negative interest rates is still present, but in the case of rental housing, the effect did not hold. They suggested that rather than spending money in later years, consumers incur debt in the early years in anticipation of revenue.

c. Influence of shifting interest rates on investment.

It was emphasized that there was significant and convincing scientific evidence that higher interest rates reduce the number of house starts (Maisel, 1968). Studies have discussed housing demand beginning as if it were a distinct entity from the overall demand for the housing supply. However, the real interest rate, the crucial underlying variable, was not properly measured in these researches. Additionally, given that owner-occupied home building is completed quickly, there was little need for the interest rate to have any direct impact on manufacturers of these homes. Of course, there would be some fascinating supply-side consequences if development did not begin right away (Kua and Keenan, 1980). They were able to demonstrate, using supply and demand arguments that a rise in interest rates unmistakably leads to a decrease in the equilibrium amount or fewer home starts. There was no interest effect on the availability of properties for sale, thus they discovered once more that higher interest rates must lower the price of housing. (Arcelus and Meltzer, 1973). The finding was that although interest rates have a direct negative impact on rental market beginnings, they have no direct impact on owner-occupied house starts.

d. Interest rates' effects on tenure selection

Kua and Keenan (1980) investigated whether the cost of a home must be equal to the discounted worth of a sequence of lease payments if consumers are agnostic about buying versus leasing. While there is no direct influence on interest rates due to the difference between investments in the owner-occupied and leased property, the cost of renting is affected. Customers who are undecided between renting and buying may nevertheless anticipate the equilibrium situation to develop over time if producers are also undecided. This presupposes that a unit built must fall into one of two categories. However, if units can quickly switch between one form and another, supply-side adjustments would likewise happen right away. They might

divide consumers into two categories even if they anticipate interest rates to remain fixed, (i) those who are very risk averse will choose to buy a home at a fixed mortgage rate. (ii) People who like taking risks will rent and accept the possibility of fluctuating interest rates. Changes in real interest rates were found to have no tangible effect.

e. The effect of changes in the interest rate on the mortgage payments

Kue and Keenan (1980) assumed that mortgage payments might become unsustainable in the short term due to rising interest rates. This is more likely to happen as a result of a decline in home prices, which assumes perfect supply inelasticity, than an increase in interest rates. They found that when demand is interest-elastic rather than price-elastic, mortgage payments fail as a result of a downward change in house demand brought on by a rise in interest rates.

In the final consideration of Kue and Keenan (1980), the model gave a deconstruction of the interest demand impact using the contemporary duality theory technique. It shows how interest rates and consumer demand for liquid items are negatively correlated. To confirm that the negative interest rate effect persisted, they looked at the scenario of leases rather than home purchases.

2.   Alternative Methods for Housing Market Modeling

Keskin's (2010) approaches investigated the spatial distribution of house prices at different times and using different data sets. The goal was to examine the effectiveness of several house pricing models in capturing the segmentation price differences in Istanbul. by employing four distinct housing market models;

   (i) The global hedonic model

   (ii) Hedonic models using dummies for the submarket

   (iii) distinct hedonic models for every submarket

   (iv) multiple models

The percentage of anticipated costs that fall within the permissible range of the actual price was used to measure the efficiency of these models. a database of 2175 real estate transactions in Istanbul, including information on dwelling unit characteristics and sale prices, gathered from adverts on two significant real estate

websites between November 2006 and April 2007. Besides from an earthquake risk, the secondary data set also included demographic, social, and geographic variables. According to findings, the test revealed that hedonic and multiple models outperform other models when using experts' submarket dummy variables. Finally, it may be concluded that policymakers, planners, and developers would have a better understanding of housing markets if housing market segmentation were taken into account.

3.   Housing market and interest rates in a housing search model

Anenberg and Kung (2017) stated that the Housing Search Model of the housing market with a mortgage and contracts was used to research how interest rates affect the dynamics of the housing market. They investigated the relationship between interest rates on 30-year fixed-rate mortgages and various relevant housing market indicators. The model may be solved both in and out of steady-state despite the rich heterogeneity that develops in the equilibrium of the model since the model structure and parameters are informed by precise microdata on property listings. While some of the parameters are specified outside of estimation, they calculate the majority of the model's parameters using the simulated method of moments. They evaluated a local housing market with a directed search model that had two different sorts of housing units (new and old). Older homes are owned by current homeowners, whereas new homes are constructed by builders utilizing undeveloped property. After one ownership period, new residences turn into old homes, and occasionally, old homes deteriorate into undeveloped land.

Some homeowners and builders will decide to sell their homes at various price points during each period. The sort of home (new or old) and price range that buyers look for will be decided by them. A submarket was defined as a house type and list price combination. Later, a frictional matching mechanism within submarkets brings buyers and sellers together. The fundamental tradeoff that the buyer must make in equilibrium is that searching at higher list prices will often lead to a faster match, but the reverse is true for sellers (Anenberg and Kung, 2017). Figure 2 shows the house searching process.
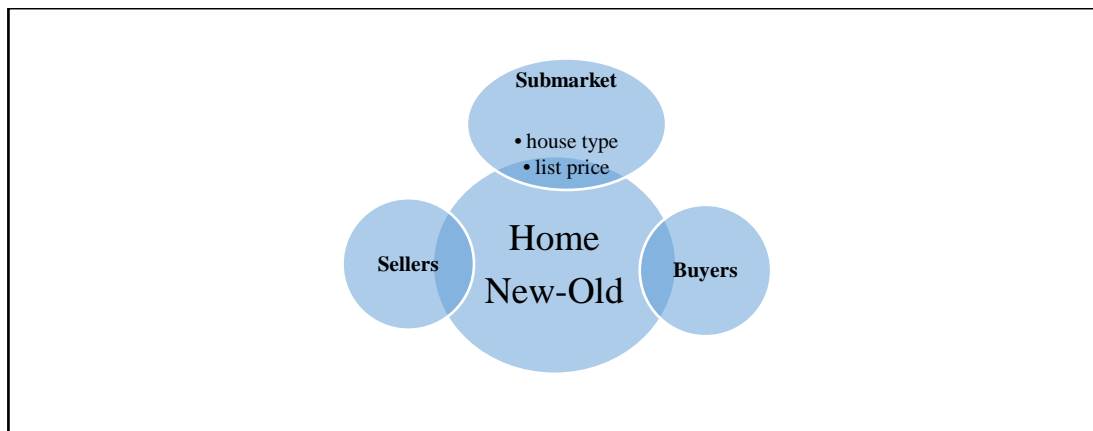
Figure 2. Frictional Matching Mechanism
Source: Adapted from (Anenberg and Kung, 2017).

The key conclusion was that although the rate of elasticity of housing valuations was underestimated, the rate of elasticity of house prices was low due to search frictions. The second major finding was that the significantly higher rate elasticity of home sales and construction than that of home prices can be attributed to search frictions. The findings revealed that monetary policy had a greater impact on property values than is often believed, at least to the extent that it can affect mortgage rates. Both the prices and the liquidity of the houses in the model made the impact on housing values obvious. They contend that the distribution of prices and the possibility of sales, rather than just the average prices of recently sold houses, determine the sustainability of the financial system. In brief, the model implied for decision-makers that there was a stronger trade-off when lowering interest rates between risks to financial stability and short-term benefits in real economic activity (Anenberg and Kung, 2017).

4.   Empirical literature

The Turkish housing market is impacted by changes in interest rates, output, and prices. The element that had the greatest impact on property values was a change in mortgage rates. In Turkey, the property market also plays an essential role in conveying monetary policy to the real economy. Additionally, there was a positive relationship between T-REIT returns and consumer price indexes and interest rates, Sari et al. (2007); Yildirim and Ivrendi (2017); Ozkan (2018); and Alhodiry et al. (2021).

According to Kue and Keenan (1980); Sutton et al. (2017); Yasin (2019), and

Abul (2020), the interest rate had a negative relationship with the real estate market in the long run. As a result of the empirical findings, short-term interest rates played a critical influence in setting housing values. They discovered that house prices have significant inertia and that interest rate increases affect house prices gradually rather than immediately. Similarly, Tem (2017) found that house prices had a strong negative association with interest rates, a weak negative relationship with inflation, a strong positive relationship with population, and a strong relationship with GDP.

As cited by Morali (2020), interest rates account for at least a quarter of the variation in residential investment, and monetary policy had a higher impact on residential investment than did output. In addition, because Turkey has a high rate of inflation, house investment could be used as a hedge. As a result, inflation could have an important impact on house demand in the market. Another important economic aspect of real estate markets in Turkey is that it has historically been a high-inflation country. It had already experienced hyperinflation and inflation-related issues. The steady nominal increase in real estate prices was the result of such an environment, which leads practitioners to believe that listing prices should constantly be greater.

However, Hameed et al. (2012) and Erol and Unal (2015) found evidence to support the premise that Turkey's export and real GDP growth are bidirectional causals in the long and short run. According to the data, economic growth in Turkey has been two to four quarters ahead of construction activity. As a result, despite the common opinion instead of being a driver of GDP growth, the building sector was more of a follower of macroeconomics variables. They discovered that the construction industry's expansion had resulted in GDP growth. The construction industry benefited from low-interest rates, which were aided by significant changes in municipal legislation and city planning, given the sector's vulnerability to interest rates. Construction projects have a short-term impact on economic growth.

According to studies by Ozer and Ozcalik (2010), and Cakici (2015) Turkey's economy has been dependent on agriculture since its founding, according to his study of the relationship between exports and the exchange rate. When the economic indicators of a community attempt to behave like those of industrial society, agrarian economies always face some challenges. A non-stable economic environment in Turkey may also be brought on by economic instability and various sorts of

exchange rate policies implemented by the Central Bank of Turkey. Although monetary policies focused on exports and exchange rates, they are only useful for recouping short-term fluctuations. Additionally, the production structure depends on imports and international trade A surplus of exports will result in an increase in imports as well. Every time the exchange rate fluctuates, the values of exports and imports vary. Credit rating agencies also set a rate for Turkey, which has a significant impact on the amount of foreign money that enters the Turkish market. as a solution, The Turkish economy would be credited with high credit and would also respond to changes in the long run as much as they do in the short run if the dependency on foreign capital and raw commodities was modified and balanced. The agricultural industry might support organic farming, even if it assumed a later return from organic farming. Consider organic market activity in Turkey as an investment in emerging technologies. Additionally, avoiding import-substituted commodities that may be produced within Turkey's production capabilities will help to reduce the country's total reliance on imported goods and services. As a result, the local output will increase, and fluctuations in exchange rates won't have the same impact on the Turkish market as they do now.

In a study conducted by Aslan and Topcu (2017), the causality results show substantial support for the four sectors' export-led growth hypothesis. The results were correct in the following industries: (i) agriculture and forestry; (ii) fishing; (iii) mining and quarrying, (iv) manufacturing; (v) electricity, gas, and water supply; and (vi) wholesale and retail trade from 2000 to 2015. However, the hypothesis was not supported by many other industries, such as property sales, leasing, and business activities.

According to studies by Allan et al. (2021), Ahsan and Sadak (2021) and Oyedeji (2021), the rate of real estate transactions did not alter during the epidemic compared to before it, but demand for industrial buildings (warehouses) grew. Government-imposed budgetary incentives have also been shown to mitigate the pandemic's negative effects. Although there was no substantial association between house sales and population density, government action during Covid-19 had played a key role in increasing housing demand. Uchehara et al. (2020) The investigation's findings show that the real estate network was vulnerable to Covid-19's influence. Overall, this research highlights a risk reduction technique that utilizes contractual

terms. Renters should be cautious, and leaseholders may consider incorporating an unforeseen condition into the contract.

C. Turkish Real Estate Market

International, as well as domestic investors, are drawn to the Turkish real estate market. The strong return on investment in Turkey's real estate sector has attracted billions of dollars in investment from around the world. Turkey's real estate market is booming. In addition, regulations allowing for an influx of foreign investment from international investors have been greatly improved. Foreigners can now buy property in Turkey, which was previously illegal. The change in property laws for foreigners in Turkey in 2012 fueled the real estate bubble. In just five years, Foreign business in Turkey rose thanks to the law and related incentives, going from 2.5 billion to 17 billion dollars (Tawfeeq, 2018: 13). Undoubtedly easing regulations for foreign investors in a variety of sectors. It is allowing the worldwide community to invest in new ways. In the twenty-first century, this will surely make Turkey a developing market (Berköz, 2000: 145). Besides that, Turkey's real estate market is under intense scrutiny by the government. Turkey's real estate and economy have flourished as a result of both government and private sector supervision.

1. The Turkish Real Estate Market's Appeal

According to Erol and Ünal (2015: 17), the six reasons why Turkey is an attractive country for investors are as follows: (1) The majority of Turkey's population is young, with 60% of the country's population under the age of 34. (2) Turkey is one of the best vacation destinations, and the property market is growing to meet demand from the travel and tourism sector. (3) Turkey is one of the world's best energy corridors. Furthermore, (4) it provides access to Europe's 1.5 billion customers. (5) As a result of increased business activity and economic growth, existing housing prices are rising. Unquestionably, (6) many investors from different countries have increased the degree of competitiveness in the real estate business. Furthermore, the phenomenon of acquisitions and mergers boosts the real estate sector's growth rate. based on data gathered in 2012 by the Association of Foreign Investors in Real Estate, Turkey ranked third among attractive nations for investment in this sector foreign investors. Istanbul has risen to fourth place in terms of growing

investment trends in Europe's real estate market (Twafeeq, 2018: 18).

2.   Strategies Aimed at Boosting TREM.

According to CBRT statistics, in 2015, there were 722,600 more licenses and permits issued for residential real estate residences, a 16 percent increase. A 24 percent decline was noted in the same sector in 2014. The value increased by a total of 27 percent in 2015. Because of government rules, regulations, and policies aimed at improving the urban environment, this improvement has only continued to grow. The government is funding programs to demolish existing structures and replace them with new ones. This government program is also contributing to Turkey's increasing construction activity (Coskun & Jadevicius, 2017: 49).

The pace of transportation projects in Istanbul, such as new bridges and the Istanbul international airport, as well as new metro lines, is picking up due to the continued development of Turkish cities and the completion of projects that facilitate people and traffic movement in these cities despite congestion and increased demand. Gaining and making money when new roads are opened and construction is finished, the value of investments in land and buildings close to these megaprojects increases by a factor of multiples, making real estate investments extremely profitable in line with the rule that huge projects provide significant returns. As a result, foreign investors are becoming increasingly interested in Turkey, causing price hikes to accelerate. In addition, the construction of earthquake-resistant buildings rather than high-risk structures has raised the demand for apartments in Turkey (Uzun et al., 2015: 1).

There are numerous reasons why foreign investors want to purchase or invest in Turkish real estate. Despite price increases in recent years, Turkish property prices remain modest in comparison to Europe and the United States, particularly in major cities such as Istanbul, Antalya, Bursa, and Yalova. The decrease in the housing price index increase in the first half of the year has given way to an upward trend in the third quarter of 2019. According to CBRT statistics in August, the annual increase in the house price index, which had been 1.74 % in June, jumped to 4.00 %.

According to the Reidin-Gyoder (2019) Turkey Residential Property Housing Price Index, the index value climbed by 5.64 % from September 2016 to September

2019, from 187.2 to 238.0. Then there's the real estate market, which offers a promising and extremely rewarding investment option. Figure 3 shows the increase in Price Index from 2016 to 2019.
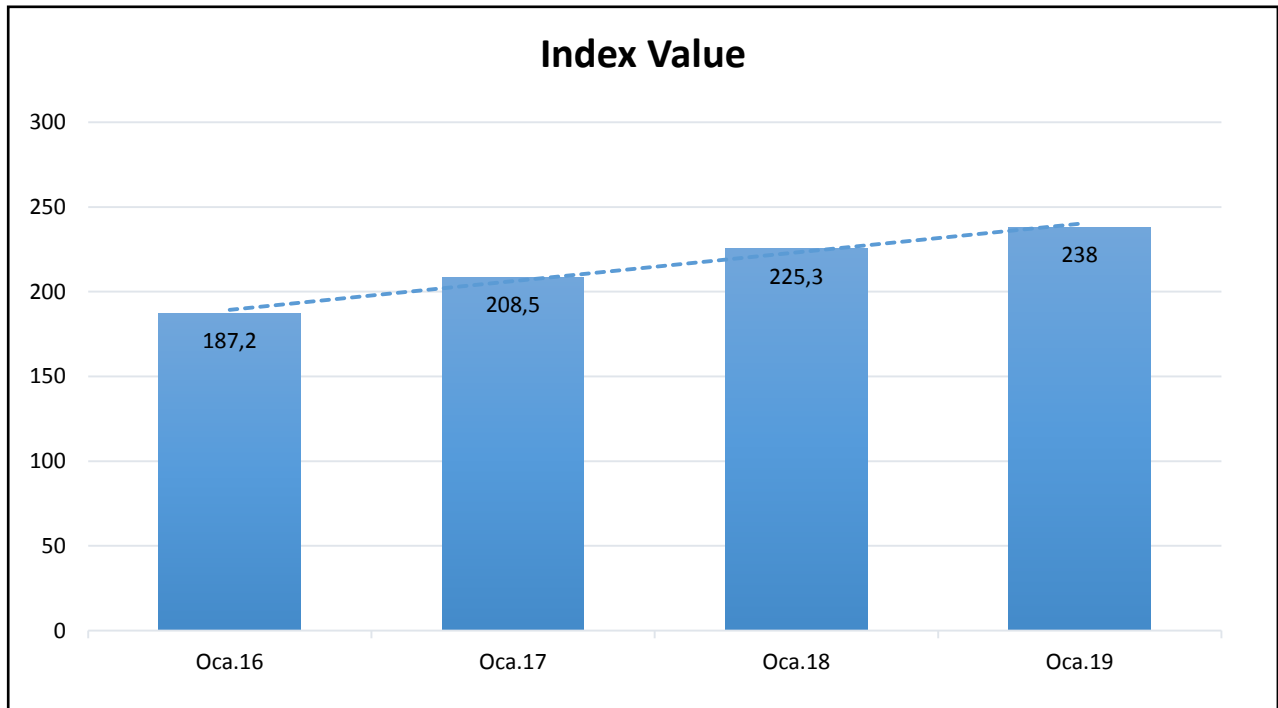
Figure 3. Turkey Residential Property Price Index (Sep 2016- Sep2019)

Source: REIDIN Turkey Residential Property Price Index.

Following the financial crisis of 2008–2009, Turkey's Central Bank began to closely watch financial market developments and implemented certain measurements of macroprudence through monetary policy channels to address these concerns. As a result, between 2010 and 2018, the banking sector's loans to the market as a proportion of GDP increased by almost 70%, while the stock of housing credits as a percentage of GDP climbed by more than 10% by the end of 2018 (Alhodir et al., 2021:3). According to figures, Changes in interest rates have a substantial effect on the real estate industry's growth. undoubtedly Real estate businesses profit from low lending rates and vice versa.

Certainly, one of the foundations of the housing sector is evaluating the sale of housing. In 2011, 997,550 residential units were sold, followed by 971,757 in 2012, 1,157,190 in 2013, and 1,165,381 in 2014, with new highs of 1,289,320 in

2015, 1,341, 453 in 2016, 1,409, 314 in 2017, and 1,375, 398 in 2018 (TURKSTAT, 2019). Residential sales fell to a long-term low of 1,348,729 in 2019 as a result of the negative impact of rising mortgage rates during the economic slowdown and foreign exchange crisis. Then Residential sales surpassed the long-term average in August 2019 and peaked in December 2019. The residential sector, on the other hand, was expanding, resulting in decreased inflation and mortgage rates, more economic activity, and enhanced expectations, and house sales grew by 1,499,316 in 2020, demonstrating the real estate market's potential(Kaynak et al., 2021: 627) Figure 4 shows the decrease and increases the annual house sales from 2011-to 2020 in Turkey.
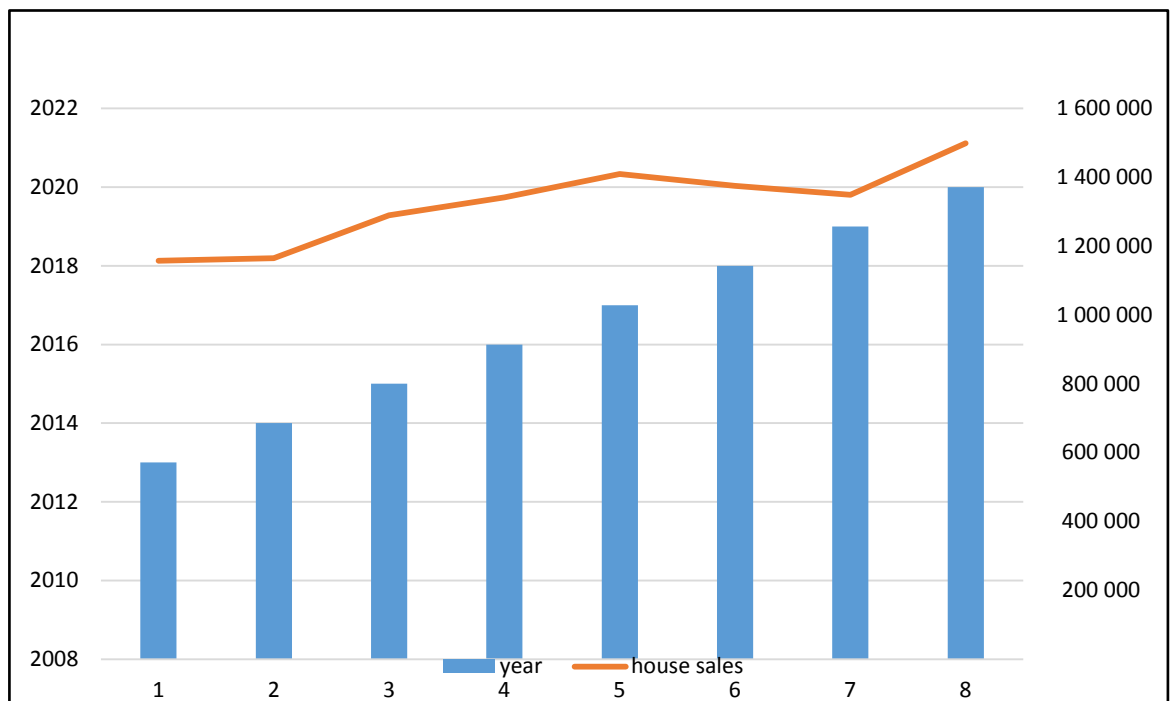
Figure 4. Number of Annual Housing Sales in Turkey (2011-2020)

Sources: General directorate of land registry and cadastre (GDLRC).

3.   Real Estate Marketing Companies

Real estate marketing is a set of activities that includes researching, organizing, carrying out, overseeing, and evaluating the efforts of organizations and individuals in the real estate and real estate investment sectors in order to respond to consumer demand for real estate. within the range commencing in the past and dating

to the future. According to Nakip et al. (2019: 16), the real estate market is always shifting. Customers have gotten more aware as competition has increased and their expectations of consumers have become more sophisticated. Real estate agents play a vital part in the escalating process of real estate marketing as they implement real estate marketing and bear the obligation of boosting the real estate market. The capabilities of their sales representatives, the number of sales representatives, the style and quality of their marketing and advertising, as well as the price they demand for real estate, all contribute to the success of real estate agents. In general, there are four parties involved in real estate marketing; (i) property owner (ii) customer (iii) the financial institution that provides financing (vi) Works as a sales agent for brokerage business.

The majority of the time, consumers deal with real estate sales agents rather than the actual property owners themselves. Additionally, while the buyer wants to purchase the property for the best and cheapest price, the seller wants to sell it for the greatest price feasible. The main duties of a real estate agent are to try to find the best way to match the seller and the buyer and to carry out the real estate transfer as quickly as possible.

III. METHODOLOGY, MODEL CONSTRUCTION AND ANALYSIS

When launching the data collecting process, the researcher must justify his or her choice of appropriate data collection, sampling, and data analysis methodologies in order to adequately address the stated goal and goals. To determine how well the procedures and methods chosen for data gathering contribute to maintaining the relevance of the research, they should be assessed and evaluated (Uchehara et al., 2020: 46). In order to highlight the benefits of each strategy in the research, the research procedures that have been discovered and applied in it are detailed in this section. The particular research comprised the data on macroeconomic effects on the TREM that were used to evaluate the general idea of the prevailing situation and the current effects of the Covid-19 pandemic that was determined through various physical surveys in many countries, including Turkey.

A. Research Approach

This study uses an econometric approach used in time series. In this study, secondary data is used. The multiple linear regression model, which is frequently used for time series, was used in the study. Before the models are built, unit root tests are performed and the stationarity assumption is checked. After the models are estimated statistically, the regression assumptions are tested by econometric tests. These tests are the Jarque-Bera normality distribution test, the Breusch-Pagan heteroscedasticity test, the Autocorrelation LM test, Variance Inflation Factors (VIF), and Stability Test (CUSUM) were performed to improve reliability and find those corner cases to determine whether they are robust enough to deliver for the study.

B. Data Collection

There are two ways to get data: primary and secondary. While secondary data

is frequently used when a researcher is attempting to establish a correlation between variables, primary data are acquired directly from respondents (Tem, 2017: 41). In this study, the data obtained for statistical analysis consists of secondary data, the study uses the multiple linear regression model as an econometric technique. This study deals with the real estate market house sales (dependent variable), house interest rates, and aggregate exports (independent variables).

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

C. Data Analysis

This study aims to show the relationship between house sales (dependent variable) and the macro-economic factors of house interest rates and aggregate exports (independent variable) by using the multiple linear regression model. The analysis of the data will be carried out using EViews12, mainly for time-series oriented econometric analysis. To detect the effects of Covid-19, the data is split into two groups: Pre- Covid-19 and during Covid-19; the first group is from January 2018 to February 2020, and the second group was from March 2020 to September 2021. To comprehend the coefficients, a logarithmic transformation is done to the variables. The log transformation can be used to completely unbalanced distributions to reduce distortion also This can be beneficial in terms of making data patterns more intelligible as well as matching statistical analysis assumptions. (Changyong et al., 2014: 105)

Models created according to two separate data are shown below:

  i.   Model from 2018M01 to 2020M02

  ii. Model from 2020M03 to 2021M09

The regression model can be represented as follows:

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

- $\log Y \rightarrow$ house sales

- $c \rightarrow$ constant coefficient

- Log $\beta_1 \rightarrow$ house interest rates

- log $\beta_2 \rightarrow$ aggregate exports

- $\epsilon \rightarrow$ the error of the regression model.

1.   Testing the Hypothesis

a. Unit root test

The stationarity of the series is examined using unit root tests. There are various unit root tests, each of which is predicated on a distinct premise. The Augmented Dickey-Fuller test is one of the most well-known unit root tests (ADF) (Herranz, 2017: 1).

The Information Criterion the Schwarz information criterion (SIC) is chosen. The stationarity tests of the series are performed and reported as seen in both tables 1 and 2. The series becomes equally stationary at the first and second differences separately. The model I becomes stationary at the second difference, while Model II becomes stationary at the first difference. Therefore, multiple linear regression models are estimated by taking the second difference for Model I and the first difference for Model II.

Table 1. Unit root test I. model (2018m01-2020m02)

Variables	Intercept P-value	P- value	Trend and Intercept P-value	P- value	None 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

Footnote: according to a 5% margin of error.

Table 2. Unit root test II Model (2020m03-2021m09)

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
$\text{Log } \beta_1(0)$	-2.298	0.1771	-1.875	0.6495	0.030	0.6869
$\text{Log } \beta_1(1)$	-4.285	0.0015	-4.230	0.0091	-4.332	0.0001
$\text{Log } \beta_1(2)$	-6.101	0.0000	-6.020	0.0001	-6.181	0.0000
$\log \beta_2(0)$	-3.321	0.0198	-3.645	6.0372	0.543	0.8296
$\log \beta_2(1)$	-9.184	0.0000	-9.101	0.0000	-9.243	0.0000
$\log \beta_2(2)$	-7.078	0.0000	-6.990	0.0000	-7.172	0.0000

Footnote: according to a 5% margin of error.

b. Multiple linear regression model

In the second phase, the multiple linear regression models based on least-squares (LS) are estimated. In the multiple linear regression model, the parameter that is utilized to calculate the dependent variable is known as the independent variable. A multiple linear regression model includes several explanatory variables. 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 (Hayes, 2022).

The following multiple linear regression models are established. The results of the model are reported in Table 3 and Table 4. The margin of error in the F and T-tests is taken as a 5% margin error. The interpretation of the models is made after robustness tests.

Table 3. Regression Results of I. Model

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 | | | |

Table 4. Regression Results of II. Model

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
djusted 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.

2. Robustness Tests

a. Normality test

To determine if a data collection is well modeled by a normal distribution and to estimate the likelihood that a random variable underlying the data set is normally distributed, normality tests are utilized. You can tell if a probability distribution is normal by looking at its shape. If the graph is fairly bell-shaped and symmetrical around the mean, you may typically infer normality (Das, 2016: 6).

Since the probability value of the Jarque-Bera normality distribution test is bigger than 0.05 in both models, the models provide the assumption of normal the distribution as represented in figures 5 and 6
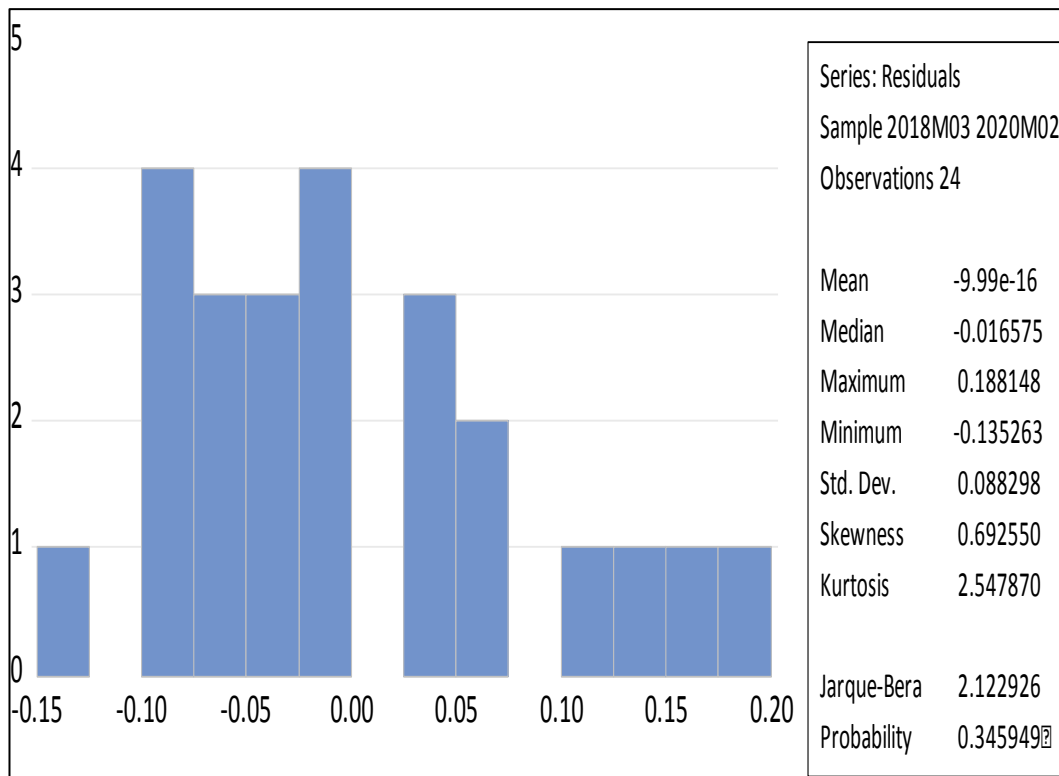
Series: Residuals	
Sample 2018M03 2020M02	
Observations 24	
Mean	-9.99e-16
Median	-0.016575
Maximum	0.188148
Minimum	-0.135263
Std. Dev.	0.088298
Skewness	0.692550
Kurtosis	2.547870
Jarque-Bera	2.122926
Probability	0.345949

Figure 5 Normality test I. Model

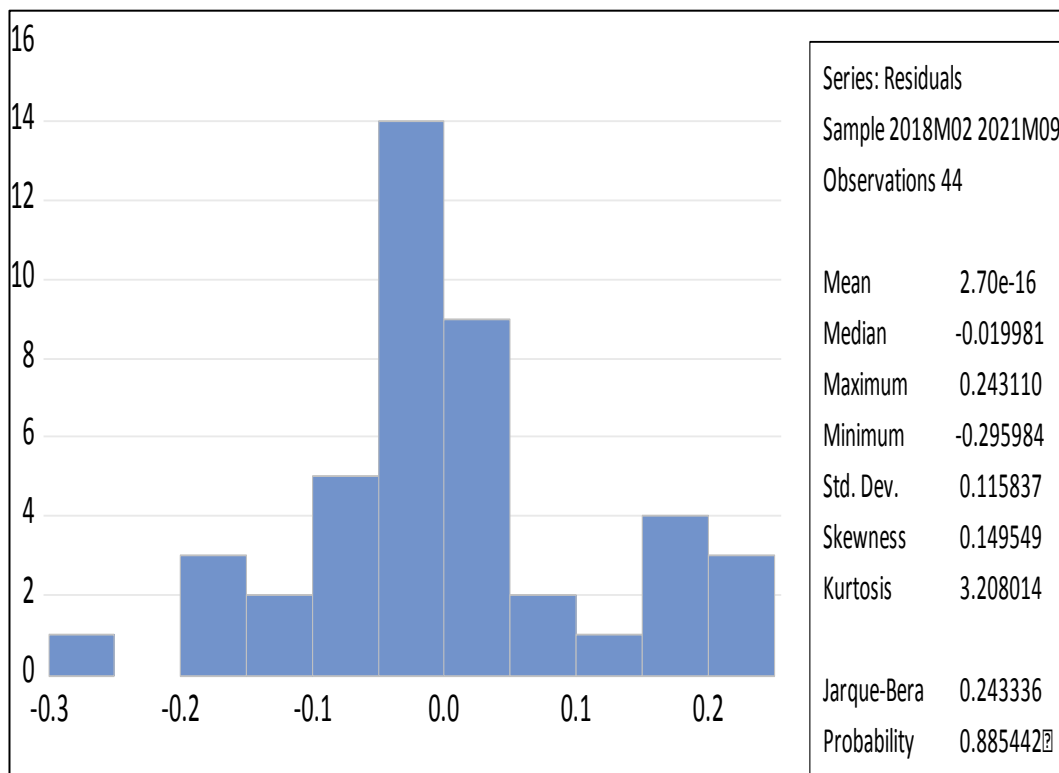|	
Series: Residuals	
Sample 2018M02 2021M09	
Observations 44	
Mean	2.70e-16
Median	-0.019981
Maximum	0.243110
Minimum	-0.295984
Std. Dev.	0.115837
Skewness	0.149549
Kurtosis	3.208014
Jarque-Bera	0.243336
Probability	0.885442

Figure 6 Normality test II. Model

b. The Breusch- Pagan heteroscedasticity test

To determine whether a linear regression model contains heteroscedasticity, the Breusch-Pagan Heteroscedasticity test is used. It posits a regularly distributed distribution for the error components. It establishes if the independent variable values have an impact on the variance of the regression errors (Hoogerheide & Borowska, 2017: 2).

The Chi-squared test generates 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 needs to be rejected for the assumption of heteroscedasticity. Since the probability value of the Breusch-Pagan heteroscedasticity test is bigger than 0.05 in both models, the models assume the assumption of residuals are homoscedastic as represented in Tables 5 and 6.

Table 5. Heteroscedasticity Test I. Model

F-satistic	1.96461	Prob. F(2,21)	0.1651
Obs*R-squared	3.782761	Prob. Chi-Square(2)	0.1509
Scaled explained SS	2.241453	Prob. Chi-Square(2)	0.3260

Table 6. Heteroscedasticity Test II. Model

F-satistic	0.75848	Prob. F(2,21)	0.4748
Obs*R-squared	1.56988	Prob. Chi-Square(2)	0.4561
Scaled explained SS	1.50487	Prob. Chi-Square(2)	0.4712

c. Autocorrelation LM test

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, since each observation is independent of the others and the serial correlation of a variable is 0, there is no autocorrelation. The observations are serially correlated and are influenced by past values if a variable's serial correlation skews toward one. (Lee, 2014: 32). As represented in Tables 8, and 9. The P values of the F and Qbs*R-squared test statistics are higher than the 5% margin of error. According to this result, first-order LM tests denote that there is no autocorrelation problem in both models.

Table 7. Autocorrelation LM Test I. Model

F-satistic	2.240175	Prob. F(1,20)	0.1501
Obs*R-squared	2.417436	Prob. Chi-Square(1)	0.1200

Table 8. Autocorrelation LM Test II. Model

F-satistic	2.147790	Prob. F(7,34)	0.0647
Obs*R-squared	13.49089	Prob. Chi-Square(7)	0.0610

d. Variance inflation factors (VIF)

The degree of collinearity between regressors in an equation is assessed using VIFs. They demonstrate the degree to which the coefficient estimate variance of a regressor has been inflated. By dividing a coefficient's variance by its other values, VIFs are produced. Variance inflation factors come in two varieties: centered and uncentered. By utilizing just that regressor and a constant, the centered VIF is derived by dividing the variance of the coefficient estimate from the original equation by the variance of the coefficient estimate. Only the uncentered VIF will be displayed if your original equation lacked a constant. (Liao & Valliant, 2012: 53).

The following is a general rule for understanding the variance inflation factor: 1 indicates that no relationship exists. A centered VIF between 1 and 5 is considered to be moderately correlated. If the number is higher than 5, they are highly correlated. Given that the Centered VIF value of both models is less than 5, as shown in Tables 9 and 10, it is determined that there is no serial correlation issue in either model.

Tabel 9. VIF I. Model

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

Table 10.VIF II. Model

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

e. Stability test (CUSUM)

The CUSUM test uses the cumulative sum of the recursive residuals. Brown et al. (1975)' CUSUM test determines the stability of regression relationships over time by using an alternative estimate for the variance of disturbances in the regression (Kramer, 1986: 3). The cumulative sum is presented along with the 5% crucial lines in this option.

Based on the results of the CUSUM test, both models seem to be properly stated. As figures 7 and 8 shown, according to the CUSUM test results, both models are correctly stated and they do not structurally change over the time period.
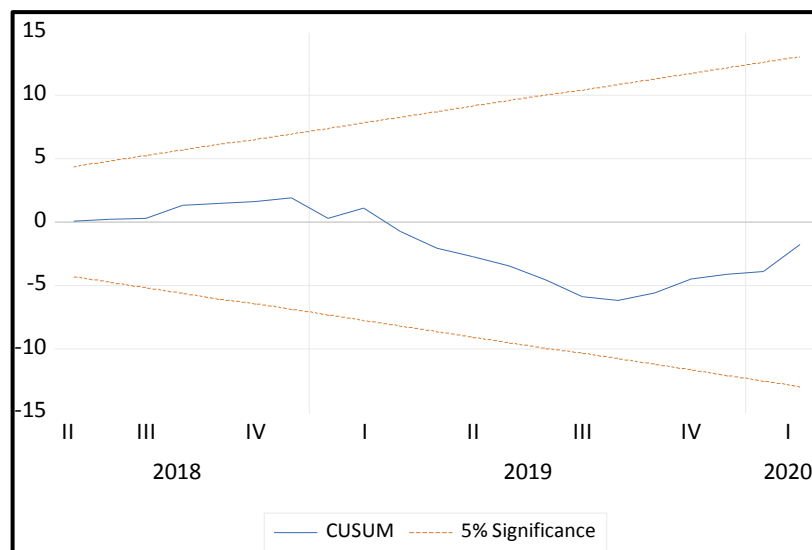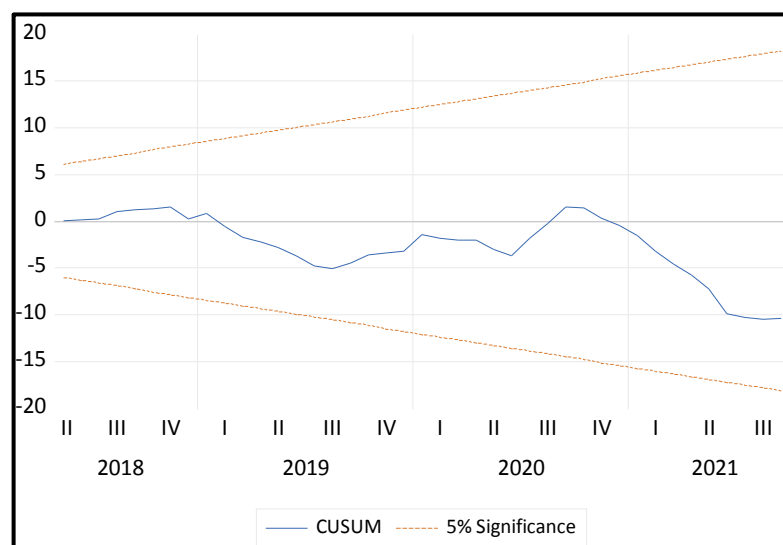

Figure 7. Stability CUSUM Test I. Model

Figure 8. Stability CUSUM Test II. Model

3. Final Display of Model I and Model II

The robustness of the models is analyzed with econometric tests. As a result of the tests, no such econometric problem is encountered. The results of two separate multiple linear regression models are reported in Table 11.

Table 11. Comparison of Two Models

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

IV. CONCLUSION

The purpose of this study is to show how Covid-19 affects the increase or decrease and to reveal the positive and negative effects of macroeconomic variables in TREM. This study aims to show the relationship between house sales and the macro-economic variables of housing interest rate, inflation, exchange rate, aggregate exports, and industrial output to show the effects of Covid-19 on the Turkish real estate market.

First, data were obtained by statistical analysis consisting of secondary data, a monthly dataset extending from January 2018 to September 2021. The data was gathered from the Turkish Statistics Institute (TURKSTAT), the General Directorate of Title Deed and Land Registry (TKGM), the Republic of Turkey's Central Bank (TCMB), and the Republic of Turkey's Ministry of Trade. Also, the data set was divided into two different periods: The first group runs from January 2018 to February 2020, while the second runs from March 2020 to September 2021. The logarithm transformation was applied to the variables to interpret the coefficients. The variables of inflation, exchange rate, and industrial output are excluded from both models because they are statistically insignificant and cause deviations in the assumptions of the multi-linear regression model implemented by EViews12. The study also reveals a relationship between the real estate market's house sales, house interest rates, and aggregate exports.

Model I. remains stationary at the second difference, while model II becomes stationary at the first difference. Moreover, robustness tests were performed to improve reliability and find those corner cases to determine whether they were robust enough to deliver for the study; normality, heteroscedasticity, autocorrelation, variance inflation factors, and stability tests (CUSUM) were used. Lastly, the robustness of the models is analyzed with econometric tests. As a result of the tests, no such econometric problem was encountered.

The empirical results for both models are as follows: (i) It was found that aggregate export was positively associated with house sales while house interest was

negatively associated with house sales in Turkey. (ii) It was discovered that the adverse effect of house interest rates was increasing during Covid-19. The coefficient is higher at -0.55 compared to the pre-Covid-19 coefficient of -0.37 effect on house sales. (iii) It was revealed that the positive effect of aggregate exports was decreasing during Covid-19. The coefficient is lower at 1.27 compared to the 1.32 effect on house sales before Covid-19 As a result, this study reaches conclusions that support the hypotheses.

In conclusion, the adverse tendency in house sales augments during the Covid-19, as the increase in house interest rates adversely affects the financial conditions of house sales in Turkey. Similarly, aggregate exports have a positive tendency with respect to house sales in Turkey. However, it is determined that this trend weakened during Covid-19.

A.   Recommendations for Future Research

The findings of the study laid the contribution for future studies and a variety of subsequent lines of inquiry. The study finds that interest rates significantly affect house sales in a negative way, while aggregate exports are positively associated. More research needs to be done, especially over a long period of time. Future studies could broaden the scope of the variables to include new variables, such as inflation and currency rates, with alternative models and statistical tests, in order to investigate house sales for a longer time period beyond Covid-19.

Turkish companies must prioritize making high-calibre technology products capable of competing internationally. Of course, this will enhance the nation's export rate and also reduce the interest rate. The amount of money entering the nation will rise, boosting consumer spending and supporting economic expansion, including real estate investment. Future studies should pay more attention to and concentrate on the role that exports play in the expansion of the Turkish economy as well as how they affect the real estate market during the Covid-19 period and beyond.

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I have 12 years of experience in the Jordanian labour market in various fields, including media and advertising, finance, real estate, general trading, and education. Most of those years were spent working as front-line support staff or management personnel in various positions (kindergarten teacher, Call Center Representative, Sales Representative and Customer Services, Senior Account Executive, Assistant Manager, HR Assistant; my last position was an HR Manager).

Publications from Dissertation, Presentations:

Zoghayyer, Diana. 2022, **Macroeconomic Effects of Covid-19 on Turkish Real Estate Market**. Covid-19 Salgını'nın Türkiye Emlak Piyasasına Makroekonomik Etkileri, Pearson Journal of Social Sciences & Humanities, Volume 7, Issue 19, April 2022.