

DETERMINANTS OF RESIDENTIAL REAL ESTATE PRICES IN TURKEY

Non Scotts Dze Tem

Student Department Business Administration, Istanbul
Aydin University, Turkey
Yesilkent Mah 1953 Mah, Innovia 2 D blok Diare 88,
Esenyurt/Istanbul, Turkey

Nurgün Komşuoğlu Yılmaz

Lecturer, Department of Business Administration, Istanbul
Aydin University, Turkey
Beşyol Mahallesi, İnönü Cd. No:38, 34295
Küçükçekmece/Istanbul, Turkey

ABSTRACT

This study analysis the determinants of residential real estate prices in Turkey. Monthly, quarterly and annual secondary data was collected for a period of 7 years from 2010 to 2016 from publications of government and financial institutions. Descriptive statistics was conducted to describe the basic features of the data in this study. Finally with the help of SPSS a multiple regression and backward elimination was carried out. The result shows that there is strong negative relation between Interest rate and house prices, weak negative relationship between house prices and inflation rate, strong positive relationship between house prices and population and a strong relationship between GDP and house prices. The trend also indicated an increase in house prices over time, this simply indicates that house prices increases over time even without any significant changes in the variables. This implies the real estate market in Turkey is significantly stable.

Key words. Real Estate Market, House Price Index, Interest Rate, CPI Inflation, GDP, Population, Multivariate Regression, Backward Elimination

1: Introduction

Real estate market in Turkey is a key sector of the economy because it is of primary interest to the private investors and to the government. This sector alone accounts for almost 20 percent of the GDP in 2016. The real estate market like any other commodity market is governed principally by the forces of demand and supply and the key attribute is the price. Turkey's economy is ranked 17th in the world, and in Europe, it is the 6th with an enormous GDP of 786 billion USD in 2016, and real estate contributing 19.5 %. Many factors account for the booming of the real estate market in Turkey over the past decades amongst which are Foreign Direct Investment FDI, FDI inflow in Turkey stands at 12.5 b USD and the real estate takes 1.6 billion USD of FDI which is 12.8 % of total FDI (Deloitte, 2013). Turkish real estate market regrouped into various categories, which are, Residential/Housing Real Estate Market, Office Real Estate Market, Retail Real Estate Market, Logistic Real Estate Market and Hotel Real Estate Market.

The real estate market in Turkey has experienced a dramatic growth rate over the past few decades and it's among the leading real estate markets in the globe. Theoretically, the conditions of the real estate are governed by the forces of demand and supply. The first law of demand stipulates that everything being equal, at low prices more of a particular good is demanded. On the contrary, according to (Burnside et al, 2011), more of some goods are being demanded at higher prices.

The major real estate market is the residential market or the housing market. This is the backbone of the real estate market sector in Turkey, which comprises properties purchased by household mostly for housing purposes. The demand for houses has led to the growth of this sector stemming from the increase in population. In 2013, housing development administration of Turkey constructed over 620.000 houses in many major cities and town around Turkey. By the end of the year 2008, the total number of houses in Turkey was approximately 16.8 million apartment units (Deloitte 2014).

According to Burnside et al, the Housing prices are one of the major determinants of the real estate market because prices are a key factor of demand in the market. Demand on its part is being determined by its micro and macro factors. Therefore to understand the development in the residential real estate market, we need to apprehend the factors of demand and supply not leaving out those behind the fluctuations in prices (Burnside et al, 2011).

1.1 Objectives of the study

The purpose of the study is to establish the determinants of residential real estate prices in Turkey and also to know to what extent these determinants can affect the residential real estate prices in Turkey from 2010 to 2016. To understand the relationship between the determinants of residential real estate prices in Turkey and the prices of real estate in Turkey.

In order to better understand the purpose of the study the critical questions are

- What are the determinants of residential real estate prices Turkey?
- To what extent can the prices of real estate in Turkey be determined by exogenous variables?

2: REVIEW OF RELATED LITERATURE

This chapter presents the views of the other authors as per the research objectives of the study. The presentation denoted the author's views concerning the study. This chapter is fundamental because it lay down a path and presents primary work, which is needed as a base for this research. After such.

2.2 Determinants of residential real estate prices

Real estate is a term used to describe a situation where property consisting of land and the buildings on it along with its natural resources such as crops water and the natural environment among others, it might constitute an item of real property buildings or housing in general. The concept of real estate involves the activity of buying, selling, or renting land, buildings or housing. Residential real estate that contains a single family or multifamily structure that is available for occupation (Case & Shiller, 2003).

The determinants of the residential real estate in countries are determined by a series of factors. In this study, the analysis takes is done based on the factors of size of the real estate market makes. There are a series of factors that determine the residential real estate prices. These include interest rates, GDP, level of money supply, and Inflation rate (Mak, Choy, & Ho, 2012).

2.2.1 Interest rates

A key factor that affects the residential real estate market is interest rates. In developed countries, the changes that occur in the interest rates in a country greatly determine the personal ability to attain the residential real estate in the country. This is because a reduction in interest rates causes the increase in the cost of acquiring money for the payment of real estate prices in a country. On the other hand, interest raises the cost to attaining the loans or mortgage lowers the demand for the residential real estate prices. The prevalence of low interests makes the buyers to attain more money and afford the purchase of several homes because of less or low mortgage payments that goes to the lender. The interest rate affect the capital flows, the supply and demand for capital including the investors required rates of return on the investments for the interest drive or affect the real estate prices in several ways (Liow, Ibrahim & Huang, 2005).

2.2.2 GDP

In addition to the above, the other factors that determine the residential estate prices are the economy health. The general economy is measured by the economic indicators such as GDP, employment, manufacturing activity and the prices of the goods in a country. The GDP is the country value of final goods and services produced in the country for a determined period. GDP per capital is known as the indicator of the country standard of living. The economic theory of per capita provides exactly that equals to the GDP income per capita. The low GDP mean that the low purchasing power hence the demand for the real estate affects the prices in decrement. The Hotels are a property that is sensitive to the economic activity in the lease structure in the business. Renting a hotel room is thought as a form of short term lease that can be easily avoided by the hotel customers if the economy is doing poorly. On the different front, the office tenants generally have longer-term leases that can't be changed in the middle of an economic downturn (Case, Shiller & Quigley, 2005).

Muthee (2012) studied the relationship that exists between economic growth and residential real estate prices in Kenya. Tracking the Hass Housing Price Index and Kenya's GDP numbers over a period of five years, data was retrieved from different sources but connected in similar or equal time and periods, reviewed and subjected to regression analysis and tested for significance. The results indicated that there is a relationship between the variables revealing that a quarterly change in housing prices yields a quarterly change in GDP.

2.2.3 Inflation

Furthermore, another factor that affect the real estate prices of the residential estates is inflation. This occurs because the real estate's need to respond to cost increases, in this case, land and building costs need to be differentiated, the available data is due to the growing security of the people construction prices have increased noticeably in the country (Gallagher, 2011). Inflation, therefore, affect the purchasing power of the money, inflation is measured by the changes in the consumer price index that measures the retail prices for the goods and services of the households (Liow, Ibrahim, and Huang, 2005). There exists a direct relationship between inflation and house prices of the residential prices in Turkey. Among the other factors that determine the prices of residential real estate is money Supply which is a broad measure of money in an economy. Increase in the supply of money will have an effect on the inflation rate, which most likely will also increase the inflation rate with its adverse effects on the economy. The excess supply of money may lead to an increase in the inflation and the environment thus affecting investment as results of higher discount rate (Liow, Ibrahim & Huang, 2005).

There are different studies conducted by Mak, Choy, & Ho, (2012) in the study Region Specific Estimate of the Determinants of Real Estate Investment in China, applied a reduced form of equilibrium model to bring forth the source of real estate investment in China (22 province, 5 regions and 4 municipality). The period under study was from 2001 to 2006 from 186 data observations. Specifically, the results provided that the demographic, economic and the planning factors determine the prices of rent.

Further studies conducted by Alves, Yoshino, Corralo & Amtein (2011) in their research to test the dimensions of the asset pricing. The researcher collected the data for the real estates in San Paulo city from January 2001 to March 2000. Therefore as per the study, the hedonic model loses its relevance in the pricing as the market risk variables become more important and relevant in the study.

According to Lieser & Groh (2011), the determinants for the commercial real estate investments using a panel of 47 countries for a period of 2007 to 2009 explored that the different socio-economic, demographic and institutional traits affect the real estate investments due to prices. Using both cross- sectional and time series analysis, running augmented random effect panel regressions. In the study conducted by Pesdel and Vizek (2009) established that house price developments in six European countries of Estonia, Croatia, Ireland, Spain, and UK. The main focus was on exploring the factors that drive the rise of residential real estate prices in the countries studied. The empirical analysis of VAR employed to predict how GDP, housing loan, interests, and construction contributes to real estate price variations.

2.2.4 Population

In the study by Mikhed (2009) provided that rapidly decreasing house prices in US have been justified by the factors such as income, population, house rent, stock, market wealth, building costs and mortgage rate. The study was conducted in the standard unit root and cointegration test with the aggregate data. The nationwide analysis potentially suffers from the problem of lower power stationarity and the ignorance depending on regional house markets. Therefore, the study employed the panel data stationarity tests, which are robust to cross sectional dependence.

In contrary to the previous studies of the US housing market, they considered several not one fundamental factor. The findings confirmed that the panel data unit root tests have greater power as compared with the Univariate tests. However, the overall conclusions are that all the methodology house the prices and does not align with the alignment in the sub-samples prior to 1996 and from 1997 to 2006. In Florida Doerner (2011) established that the pathways are by change in the house prices can affect city revenue per capita and test for symmetric effect during the housing booms and busts.

3: METHODOLOGY

3.1 Research Design

This study employed a cross sectional research with a time series approach where a quantitative approach that was used to investigate the determinants of residential real estate prices in Turkey for the period of 7 years from 2010 to 2016. The descriptive design will be used to discover causal description to provide precise quantitative description and to observe behaviour. The secondary data for the period of 7 years was collected from Turkish Central Bank (TCMB), Turkish Statistical Institute (TURKSTAT). In this study, the researcher used composite property index published on a half or quarterly basis for 7 years published by Istanbul city authority statistics department.

3.2 Data Collection

The data collection was done through secondary data that entailed analysing the already published statistical data. For this study, we are dealing with House Price Index (dependent variable), interest rate, inflation rate, GDP and Populations (Independent variable). For the House Price Index, we collected secondary data for the period of 7 years from TCMB. For Interest rate, the data collected annually data for the period of 7 years from Fred Economic Data, for Inflation rate collected secondary data for the period of 7 years from World Wide Inflation Data. For GDP and Population, we collected data for the period of 7 years from TURKSTAT.

3.3 Data Analysis

The analysis of data was carried out through means of mean, standard deviation, percentages, regression and correlation through the usage of statistical packages for social scientists (SPSS)

In order to come up with the regression model showing the relationship that exist between the dependent variable of residential real estate Prices and the macro-economic factors of interest rates, GDP, population, and inflation a Regression analysis was applied. The regression assessment was done using internal attributes dimensions as proposed in the Green (1997) model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + E$$

Which can be translated into?

Where

RREP= Residential Real Estate Prices

IntR. = Interest Rate

InfR= Inflation Rate

GDP= Gross Domestic Product

POP= Population

ϵ The error term.

The regression function expressed the effect of the independent variable on the dependent variable. The beta value of the degree of the effect and relationship between the variables. Also, the Karl Pearson's Correlation Analysis was used in order to determine the strength of the relationship between two random variables.

4: RESULTS AND DISCUSSION

In this chapter, the researcher had an indebt look at the analysis, results, and interpretation of the data collected. The data was collected from the Turkish National Bureau of Statistics, The Central Bank of Turkey, Fred Economic Data, and from the World Wide Inflation Data. The data obtained was fed into SPSS version 19.0 and used to detect how GDP, Interest Rate, Inflation, and Population has an impact on the housing prices using descriptive and multivariate regression model. We also collected data about the current interest rate from 2010 to 2016, which covers the period of study.

4.1 Descriptive statistics

4.1.1. Descriptive Statistics for Residential Real Estate Price

Year	Mean HPI	Std. Dev.	Lower	Higher
2010	9999500	224388.259	9692000	10356000
2011	11021500	357152.756	10429000	11530000
2012	12307917	399117.768	11622000	12861000
2013	13869250	530669.067	13006000	14637000
2014	15881167	763635.901	14755000	16999000
2015	18801917	957546.15	17219000	20128000
2016	21481417	819154.937	20232000	22595000

Table 1: The mean house prices by year

Table 1. Shows the mean house prices from 2010 to 2016, which shows how the housing prices have increased steadily from 9.99 million TL in 2010 to 21.48 million TL 2016. The standard deviations are also increasing steadily alongside the means

4.1.2. Descriptive Statistics for Interest Rate

Year	Mean Int	Std. Dev	Minimum	Maximum
2010	14.92	0.28	14	15
2011	14.23	0.83	14	17
2012	16.26	0.97	13.5	17
2013	11.23	2.02	9.5	13.5
2014	10.15	0.35	9	10.25
2015	9	0	9	9
2016	8.89	0.69	8.75	9

Table 2 Descriptive Statistics for Interest Rate. Source. Study Data 2017

From our study, the average interest rate is 14.92% in 2010, for 2011 the average interest rate stands at 14.25%, in 2012 average interest rate is 16.2%, in 2013 interest rate is 11.23%, in 2014 interest rate stands at 10.15%, in 2015 the interest rate stands at 9%, while in 2016 the average interest rates is at 8.98%. From our statistics the highest interest arrived is 16.2% while the lowest in 8.98%.

4.1.3. Descriptive Statistics for Inflation Rate

Year	Mean Inf Rate	Std. Dev	Minimum	Max
2010	8.58	1.25	6.4	10.19
2011	6.33	2	3.99	10.45
2012	8.72	1.72	6.16	11.14
2013	7.49	0.73	6.13	8.88
2014	8.8	0.64	7.75	9.66
2015	7.75	0.61	6.81	8.81
2016	7.84	0.94	6.57	9.58

Table 3 Mean Inflation (CPI) by Year. Source. Study Data 2017

From table 3. We can depict that the inflation rate is fluctuating representing 8.58% in 2010, to 6.33% in 2011, 8.72% in 2012, 7.49% in 2013, 8.8% in 2014, 7.75% in 2015 and 7.84% in 2016. The standard deviations have been fluctuating in the same manner like the mean inflation rate

4.1.4. Descriptive Statistics for GDP

Year	Mean GDP	Std. Dev.	Minimum	Maximum
2010	290003495	3.86	240272872	322360447
2011	348619271	4.47	290610290	385734139
2012	392418028	4.49	333164005	429732717
2013	452428271	5.01	385824643	491085106
2014	511116469	5.06	451269184	557419788
2015	584661873	6.84	497687043	646500325
2016	652131437	7.63	563890602	747226024

Table 4. Mean GDP by Year. Source. Study Data 2017

From the table the GDP has been increasing steadily from 2010 to 2016. The standard deviation and mean have been increasing steadily like the GDP.

4.1.5. Descriptive Statistics for Population Growth.

Year	2010	2011	2012	2013	2014	2015	2016	Mean Pop	Std
Pop Growth	72326914	73409455	74569867	75787333	77030628	78271472	79512426	75844014	2.6

Base on the data the population is in an increasing trend over the years. 2010 recorded the lowest average population *Table 5. Mean Population Growth by Year.*

Growth of 72.32 million people followed by 2011 with 73.41 million people, in 2012 and continue till 2016 where we recorded 79.51 million. But the mean of our studies stands at 75.84 million while the standard deviation stands at 2.6.

4.2. Inferential Statistics

4.2.1. Coefficient of Determination on Determinants of Residential Real Estate Prices

The coefficient of determination measures how the model is most likely to predict the result. R-Square is the square of the sample correlation coefficient between the dependent and independent variables..

Model	R	R-Square	Adjusted R-Square	Std. Err of the Estimate
1	1.000 ^a	1.000	.999	1588.77371

Table 7. Summary of the Regression Model

a. Predictors: (Constant), Population, Inflation, Interest Rate, GDP

R-Square= 1, this means the independent variables or predictors (interest rate, inflation rate, GDP and population) taken as a set accounts for 100% of variance or changes in the outcome or dependent variable (House Prices). Statistically whenever adjusted R-Square is greater 0.75 then the model is significant.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.062E10	4	2.654E9	1051.478	.001 ^a
	Residual	5048403.827	2	2524201.913		
	Total	1.062E10	6			

Table 8. ANOVA Analysis

a. Predictors: (Constant), Population, Inflation, Interest Rate, GDP

b. Dependent Variable: HPI

Anova is the test to know if R-square is significantly > 0. From the table since Sig <0.05 which is =0.001, then we know R-square is sig <0. This means our predictors or independent variables can account for a significant amount of variance in the dependent variable of house prices. Therefore the regression model is significant.

Test using alpha=1, $F(4,2) = 1051.48 < 0.005$ $R^2 = 1$

This tells us overall our regression analysis was statistically significant because when take the 4 independent variables as a group they predict the dependent variable significantly.

4.2.2. Multiple Regression Analysis for Determinants on Residential Real Estate Prices

The purpose of this technique is to study the relationship between predictors or dependent variables and

criterion or dependent variables. The analysis of the multiple regressions is presented on Table 9.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1 (Constant)	2999213.604	389082.301		7.708	.016	1325127.578	4673299.629
Interest Rate	-801.752	529.234	-.057	-1.515	.269	-3078.862	1475.359
Inflation	5146.294	1001.409	.109	5.139	.036	837.578	9455.011
GDP	.000	.000	3.752	10.540	.009	.000	.000
Population	-.045	.006	-2.811	-7.734	.016	-.071	-.020

Table 9. Multiple Regression Analysis on Determinants on Residential Real Estate Prices.

a. Dependent Variable: HPI

Table 9. Shows the relationship between residential real estate prices and the four variables of interest rate, inflation rate, population and GDP to other variables. A total of 35 data points were used by the used of annually data for the period of 7 years to give more accuracy.

From the table,9 it shows that everything held constant the residential real estate prices will be 2999213.60 TL, however after incorporating the values the model moves from

$$(Y= \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5)$$

To

$$RREP= 2999213.6 -801.75IntR+5146.29InfR+0.00GDP-0.045POP$$

Where

RREP= Residential Real Estate Prices

IntR. = Interest Rate

InfR= Inflation Rate

GDP= Gross Domestic Product

POP= Population

Discussion: From the multiple regression equation established, we noticed the Y-Intercept = 2999213.6TL, this simple implies taking all factors (interest rate, inflation rate, GDP, and population) constant the price of real estate will be 2999213.6TL. From the data analysed we can also notice that holding everything constant at zero if we vary interest rate by 1 unit we will notice 801.75 reduction in the residential real estate house prices. Also if we vary the level of inflation rate by 1 unit while holding other variables constant at zero us will realize a 5146.29 increase in the residential real estate prices. Furthermore, if we vary by 1 unit the GDP while holding other constant at zero then we will be no change in the residential real estate prices. And finally, when we vary by 1 unit the value of population while holding other variables constant, we will realize a drop of 0.045 of the residential real estate prices. At 95% confidence interval and at 5% significant level we have the following corresponding significant value. Interest rate had a significant value at 5% of 0.269. Inflation rate at 5% significant level presents a 0.038 significant value, while GDP at 5% significant

level present a 0.09 significant value and finally population had a significant value 0.016 at 5% significant level. Interest rate has the highest significant value at 0.269, therefore interest rate is the most significant factor when determining the residential real estate prices in Turkey.

4.2.3. Backward Elimination Analysis for Determinants on Residential Real Estate Prices

Looking at our sig. values at 95% interval and 5% significant level from the multiple regression analysis we will notice 0.269 for interest rate, 0.038 for inflation, 0.09 for GDP and 0.016 for population. In this situation, we will have to re run our model using the backward elimination in order to reduce the number of independent variables.

Model	Variables Entered	Variables Removed	Method
1	Population, Inflation, Interest Rate, GDP ^a	.	Enter
2	.	Interest Rate	Backward (criterion: Probability of F-to-remove >= .100).

Table 10. Variables Entered/Removed^b

a. All requested variables entered.

b. Dependent Variable: HPI

Table 10 shows the result from backward elimination, in this table it shows the initial regression took into consideration all the independent variables of Interest rate, Inflation rate, GDP and Population, but from those independent variables Interest rate will be removed since it is not statistically significant.

Model	R	R-Square	Adjusted R-Square	Std. Err of the Estimate
1	1.000 ^a	1.000	.999	1588.77371
2	.999 ^b	.999	.998	1901.00582

Table 11. Summary of Backward Elimination Model

a. Predictors: (Constant), Population, Inflation, Interest Rate, GDP

b. Predictors: (Constant), Population, Inflation, GDP

This model summary shows both the model summary for 1 which is for the initial Multiple Regression and 2 for the Backward Elimination. R-Square Model 1= 1, this means the independent variables or predictors (interest rate, inflation rate, GDP, and population) taken as a set accounts for 100% of variance or changes in the outcome or dependent variable (House Prices). R-Square Model 2= 0.99, this means the independent variables or predictors (inflation rate, GDP, and population) taken as a set accounts for 99% of variance or changes in the outcome or dependent variable (House Prices).

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.062E10	4	2.654E9	1051.478	.001 ^a
	Residual	5048403.827	2	2524201.913		
	Total	1.062E10	6			
2	Regression	1.061E10	3	3.537E9	978.721	.000 ^b
	Residual	1.084E7	3	3613823.112		
	Total	1.062E10	6			

Table 12. ANOVA^c

a. Predictors: (Constant), Population, Inflation, Interest Rate, GDP

b. Predictors: (Constant), Population, Inflation, GDP

c. Dependent Variable: HPI

Anova model 1 is the test to know if R-square is significantly > 0 . From the table since Sig < 0.05 which is $= 0.001$, then we know R-square is sig < 0 . This means our predictors or independent variables can account for a significant amount of variance in the dependent variable of house prices. Therefore the regression model is significant.

Interpretation of Anova Table Test using alpha=1 $F(4,2) = 1051.48 < 0.005$ $R^2 = 1$

This tells us overall our regression analysis was statistically significant because when take the 4 independent variables as a group they predict the dependent variable significantly.

Anova model 2 is the test to know if R-square is significantly > 0 . From the table since Sig < 0.05 which is $= 0.000$, then we know R-square is sig < 0 . This means our predictors or independent variables can account for a significant amount of variance in the dependent variable of house prices. Therefore the regression model is significant.

Interpretation of Anova Table Test using alpha=0 $F(3,3) = 978.721 < 0.005$ $R^2 = 0$

This tells us overall our regression analysis was statistically significant because when take the 4 independent variables as a group they predict the dependent variable significantly.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2999213.604	389082.301		7.708	.016
	Interest Rate	-.801.752	529.234	-.057	-1.515	.269
	Inflation	5146.294	1001.409	.109	5.139	.036
	GDP	.000	.000	3.752	10.540	.009
	Population	-.045	.006	-2.811	-7.734	.016
2	(Constant)	2825437.011	444854.003		6.351	.008
	Inflation	4544.036	1099.745	.096	4.132	.026
	GDP	.000	.000	3.653	8.725	.003
	Population	-.043	.007	-2.661	-6.360	.008

Table 13. Backward Elimination for Determinants on Residential Real Estate Prices

a. Dependent Variable: HPI

Table 13: Model 1 shows the relationship between residential real estate prices and the four variables of interest rate, inflation rate, population and GDP to other variables. A total of 35 data points were used by the use of annually data for the period of 7 years to give more accuracy. From the table, it further shows that everything held constant the residential real estate prices will be 2999213.60 TL, however after incorporating the values the model moves from

$$(Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5)$$

To

$$RREP = 2999213.6 - 801.75IntR + 5146.29InfR + 0.00GDP - 0.045POP$$

Where

RREP= Residential Real Estate Prices IntR. = Interest Rate InfR= Inflation Rate

GDP= Gross Domestic Product POP= Population

Discussion: From the multiple regression equation established, we noticed the Y-Intercept = 2999213.6TL, this simple implies taking all factors (interest rate, inflation rate, GDP, and population) constant the price of real estate will be 2999213.6TL. From the data analysed we can also notice that holding everything constant at zero if we vary interest rate by 1 unit we will notice 801.75 reduction in the residential real estate house prices. Also if we vary the level of inflation rate by 1 unit while holding other variables constant at zero we will realize a 5146.29 increase in the residential real estate prices. Furthermore, if we vary by 1 unit the GDP while holding other constant at zero then we will be no change in the residential real estate prices. And finally, when we vary by 1 unit the value of population while holding other variables constant, we will realize a drop of 0.045 of the residential real estate prices. At 95% confidence interval and at 5% significant level we have the following corresponding significant value. Interest rate had a significant value at 5% of 0.269. Inflation rate at 5% significant level presents a 0.038 significant value; while GDP at 5% significant level presents a 0.09 significant value and finally population had a significant value 0.016 at 5% significant level. Interest rate has the highest significant value at 0.269; therefore interest rate is the most significant factor when determining the residential real estate prices in Turkey.

Model 2 shows the relationship between residential real estate prices and the three remaining variables of, inflation rate, population and GDP to other variables after eliminating the interest.

$$(Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4)$$

$$RREP = 2825437.011 + 4544.036InfR + 0.00GDP - 0.043POP$$

Where RREP= Residential Real Estate Prices, InfR= Inflation Rate GDP= Gross Domestic Product, POP= Population

Discussion: From the multiple regression equation established, we noticed the Y-Intercept = 2825437.011 TL, this simple implies taking all factors (inflation rate, GDP, and population) constant the price of real estate will be 2825437.011TL. From the data analysed we can also notice that holding everything constant at constant if we vary the level of inflation rate by 1 unit while holding other variables constant at zero we will realize a 4544.036 increase in the residential real estate prices. Furthermore, if we vary by 1 unit the GDP while holding other constant at zero then we will be no change in the residential real estate prices. And finally, when we vary by 1 unit the value of population while holding other variables constant, we will realize a drop of 0.043 of the residential real estate prices. At 95% confidence interval and at 5% significant level we have the following corresponding significant value. Inflation rate at 5% significant level presents a 0.026 significant value, while GDP at 5% significant level present a 0.003 significant value and finally population had a significant value 0.008 at 5% significant level.

5. Conclusions

The study that set to investigate the determinants of real estate prices of the houses. The determination was based on interest rates, inflation Gross domestic product and population growth. The results provide significant correlation on the residential real estate prices on the determinants studied. The study concludes that there is a significant relationship between real estate house prices with interest rate, inflation, and GDP and population growth. Therefore the macroeconomic aspects under the study including the population growth of a country effectively explain the rise of the house prices in Turkey. Even though the study established a negative relationship between interest rates and house prices. The study further concludes that based on the results there was overall increment in the house prices over the period of time under the study a signal to the ever-changing factors of the study (inflation, interest rates, GDP, and population growth). The study variables, therefore, can be cited as being salient explanations to the house prices in Turkey provided in the context of the study.

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