

# The Determinants of Foreign Direct Investment in Real Estate Market of Turkey: Evidence from a Cointegrated VAR

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## Abstract

The aim of the study is to analyze the macroeconomic determinants of foreign direct investment in real estate sector (FDIRE) covering the period from 2003:01-2016:12 for Turkey. To this aim, Johansen cointegration test and VECM (cointegrated VAR) have been employed and also impulse response functions and forecasted error variance decompositions have been analyzed to shed light on the issue of the nexus between selected macroeconomic indicators and FDIRE. Empirical findings suggest that the number of one-year lagged tourist arrivals and real house rent is the most important and statistically significant determinants of foreign direct investment in Turkish real estate sector. The findings imply that real house rent shocks also have a positive and significant impact on real house price.

**Keywords:** Real Estate Market, FDIRE, Cointegration, CVAR, Turkey

**JEL Codes:** R3, F21, C32

## **Türkiye'nin Gayrimenkul Piyasasına Doğrudan Yabancı Yatırımın Belirleyicileri: Bir Eşbütünleşik VAR'dan Kanıtlar**

### **Öz**

Bu çalışmanın amacı Türkiye'de 2003:01-2016:12 dönemi için gayrimenkul sektörüne gelen doğrudan yabancı yatırımın (FDIRE) makro ekonomik belirleyicilerini analiz etmektir. Bu amaçla Johansen eşbütünleşme testi ve vektör hata düzeltme modeli (eşbütünleşik VAR) kullanılmış ve ayrıca seçilen makro ekonomik büyüklükler ile FDIRE arasındaki ilişkiye ışık tutmak için etki tepki fonksiyonları ve hata varyans ayrıştırmaları analiz edilmiştir. Ampirik bulgulara göre, Türk emlak sektörüne gelen doğrudan yabancı yatırımın en önemli ve istatistiksel olarak anlamlı belirleyicileri gelen turist sayısının bir yıl gecikmeli değeri ile reel ev kiralarıdır. Sonuçlar reel ev kirası şoklarının reel ev fiyatları üzerinde de pozitif ve anlamlı bir etkisi olduğunu ortaya koymaktadır.

**Anahtar Kelimeler:** Gayrimenkul Piyasası, Gayrimenkule DYY, Eşbütünleşme, Eşbütünleşik VAR, Türkiye

**JEL Sınıflaması:** R3, F21, C32

## Introduction

Real estate investment movements increased all over the world since 2008 financial turmoil. Many global cities (e.g. London, New York, Hong Kong etc.) attracted foreign investments to their real estate sector increasingly during the past decade. Foreigners purchased these properties generally in order to make investment. For example, Poon (2017) reports that majority of the purchased properties by foreigners in London is not for residential purposes. Wong (2017) reports that 15.6 percent of real estate has been sold to foreign buyers in the first quarter of 2015 in Australia. These issues are remarkable to show the importance of investments made by foreigners in a real estate market.

Due to lack of capital to attain sustainable growth, developing countries need to attract more foreign direct investment than their developed counterparts. Turkey, one of the developing countries, makes great efforts to gain foreign capital as well. Real estate sector has become one of the important fields of the economy in terms of foreign direct investment attraction in the last decade. Consequently considering capital need of Turkey, the importance of foreign direct investment in real estate (FDIRE) sector has been increasing.

Real estate markets have been one of the important sectors after 1980s in Turkey. Governments put a premium on real estate markets especially between the years 1984-1989 and the period after the year of 2003. After the 1980s, Turkey made some amendments to attract foreign capital, including foreign direct investment on real estate sector. With those amendments, the level of FDIRE has increased remarkably in the last decades. The share of FDIRE in the total foreign direct investment (FDI) is 14.8 and 45.56 in 2008 and in 2018 respectively according to balance of payments statistics. Therefore, it would be an important step to reveal the determinants of FDIRE. Also, findings in this study might be remarkable in implementing new policies by policy makers.

The main purpose of this study is to investigate the determinants of FDIRE in Turkish real estate sector. To the best of our knowledge, there is no study investigating the determinants of FDIRE in Turkey. Therefore, the paper is considered to fill this gap in the literature. The paper is organized as follows. Literature review is explained in the following section. In the third section, brief information has been given regarding Turkish real estate market. Econometric model and description of the variables are presented in the fourth and fifth sections. In the sixth section, empirical results are reported and finally

the paper is concluded.

### Literature Review

There is a growing attention in revealing the determinants of FDIRE in the related literature. Although several methods had been utilized by researchers, we will focus on the papers which employed econometric techniques. Those papers generally have employed cointegration techniques and panel methods to investigate the determinants of FDIRE. Among them, employing Engle Granger method, Rodríguez and Bustillo (2010) test the presence of cointegration between foreign real estate investment and some macroeconomic variables. Rodríguez and Bustillo (2010) utilize three models (financial model, the demand for service model, eclectic model) measuring the effect of foreign real estate investment in Spain. Results suggest that the main determinants of FDIRE in Spain are 'Housing Prices, GDP per capita and the number of tourists'. While housing prices affect FDIRE negatively, GDP per capita and tourism agglomeration affect FDIRE positively.

Gholipour et. al. (2010) investigates the relationship between tourism agglomeration and FDIRE, using multivariate cointegration approach. They test causal relationship between Iranian tourists and investments made by Iranians in Dubai's real estate market. While causality between the variables works bidirectional in the short run, results suggest that a surge in the number of Iranian tourists in Dubai increases the level of Iranian investment in Dubai's real estate sector in the long run.

Utilizing error correction model and Granger causality test, Bo and Bo (2007) analyses mainly the link between house prices and international capital mobility for China for the period from 1998 to 2006. Foreign investment, house price index, land price index and inflation rate has been used in the model. The results of cointegration test suggest cointegrated vectors among inflation rate, housing prices, land prices and international capital flows. Also, while an increase in house prices attract international capital flow in the short run; foreign capital inflows affect house prices positively in China in the long run. These findings are in line with Cuestas (2017) which analyses the relationship among real house prices, nominal interest rates, real labor income and net capital flows for the period of 2001Q1-2008Q4 utilizing CVAR and Bayesian VAR methods. The paper reports that house prices are positively affected by foreign capital inflows as well.

Some studies utilize *panel methods* to determine the characteristics of

foreign investment in real estate markets. Gholipour and Masron (2011) report the impact of tourism agglomeration on FDIRE covering the period of 1999-2008 for 19 OECD countries including Turkey, utilizing panel method. The findings of the study indicate that among the other potential variables - GDP, house price, 'road mileage per capita proxy for infrastructure', 'corruption perceptions index proxy for transparency' - tourism agglomeration has a significant and positive effect on FDIRE in line with the results of Rodríguez and Bustillo (2010). However, Poon (2017), aiming to find the determinants of FDIRE in England through panel data analysis, finds no evidence in favor of positive relation between the number of tourists and FDIRE.

Gholipour (2013) aims to analyze the determinants of foreign investments in residential properties (FIRP) for 14 Malaysian states covering the period 2004-2010, conducting generalized method of moments. Empirical findings show that tourism agglomeration, well-being of the local people, foreign investments in other sectors, religious diversity and minimum property purchase price are significant variables in determining FIRP.

Employing panel cointegration and panel causality tests, Gholipour et. al. (2014) investigates the relation between property prices, FDIRE and economic growth in OECD countries for the period from 1995 to 2008. Dissimilarly from the studies mentioned above, FDIRE has been used as an independent variable in the model where dependent variable is PPRIC (property prices). The results obtained from cointegration method suggest that there is a positive relation between PPRIC and GDP. Also, findings show a positive relation between property prices and inflation. However, any evidence has not been found in favor of causal link between FDIRE and PPRIC and also between GDP and FDIRE. The surge in the prices of property leads to an increase in the level of GDP.

Hui and Chan (2014) analyzes the determinants of foreign direct investment in Chinese real estate market covering the period of 2005-2010 by using annual regional data. Employing panel method, the authors find evidences showing that 'the number of foreign enterprises' and GDP have positive impact on FDIRE. Another study utilizing regional Chinese data (He et. al., 2011) investigates the determinants of foreign capital inflows in China's real estate market for the years between 1997 and 2007, employing mainly spatial method. Findings suggest that coastal side of China attracts FDIRE more than inland side of China.

Utilizing the pooled Tobit model technique for panel data, Salem and Baum (2016) analyzes the determinants of foreign investment in real estate markets for eight selected MENA countries (Algeria, Egypt, Morocco, Qatar, Saudi Arabia, Turkey, Tunisia and the UAE). Some variables used in the study, especially 'the quality of institutions and regulations' and 'political stability', have strong impact on commercial real estate FDI.

There are several studies (e.g. Erdal and Tatoğlu, 2002; Deichmann et. al., 2003; Dumludag, 2009; Bilgili et. al., 2012) analyzing mainly the effects of total foreign direct investments in Turkey. However, some studies (Sirin, 2017; Polat and Payaslıoğlu, 2014) address sectoral aspects rather than examining the effects of total foreign direct investment. This study contributes to the related literature since there is no study investigating the determinants of foreign direct investment in Turkish real estate market.

### **Real Estate Markets in Turkey**

Turkish government has taken radical decisions on 24<sup>th</sup> of January 1980 regarding the economic strategy of Turkey. With those decisions, policy makers aimed to apply market economy mechanism and export-led growth strategy rather than traditional import substitution policy in Turkey. Those neoliberal policies brought about high interest rate and high inflation rate during the end of 1980s and 1990s. Especially during 1990s, this instable macroeconomic environment discouraged growth of real estate markets because of both high interest rates and absence of long term mortgage loans in Turkey. Turkey's real estate market also suffered earthquakes of 1999 August and November which strikes northwestern of the country where one-third of the population lives. Only two years after the disaster, *2001 financial crisis* hits Turkey causing the interest rates and exchange rates to increase dramatically.

After emerging of the financial crisis, an IMF stabilization program, targeting low inflation and some reforms, has been applied by the government. During 2000s, interest rates and inflation rates have declined in line with the targets of the program remarkably. Such a macroeconomic environment has been convenient for the development of Turkish real estate markets. Besides, mortgage law enacted in 2007 has provided some easements for both buyers and sellers in the real estate markets. For instance, tax incentives have been legislated within the mortgage law in order to expand the housing market in Turkey. At the same time, these incentives encouraged buyers to purchase dwellings

in formal housing market rather than informal housing. Also, along with the mortgage law, 'Consumer Protection Law' has been amended in terms of variable and adjustable interest rates in favor of consumers (Gülter and Basti, 2014). In conclusion, legal infrastructure, which is necessary for expansion of the housing market, has been provided after the introduction of the new mortgage law.

Starting with the decisions of 24<sup>th</sup> of January 1980, Turkish economy has become more open economy during the last four decades. Governments have had great efforts to increase capital inflows through foreign direct investment and portfolio investment. Capital inflows as foreign direct investment have been attracted by also Turkish real estate markets like the other sectors in the Turkish economy. To this aim, some legal amendments have been made in Turkey to obtain foreign direct investment to the real estate market. For instance, while the property law, enacted in 1934, supports reciprocity principle which is likely to be considered as an obstacle against foreign investors in the real estate markets, this reciprocity principle was cancelled in 2012 (see Official Gazette, 2012). Although foreign investors were not able to gain immovable property which is bigger than 2.5 hectares, this restriction is relaxed up to 30 hectares after the introduction of the law. In addition to that, foreigners are allowed to purchase lands regardless of their types (planned or not, agricultural or not). However, foreigners were able to purchase lands only from planned areas of the country before the introduction of the law.

Consequently, with the cancellation of the reciprocity principle, the volume of the Turkish real estate market has augmented for the foreigners. This cancellation might be considered as one of the most important efforts to decrease restrictions on FDIRE which in turn likely leads to boost the level of FDIRE. Compared to the other countries in terms of restrictions on foreign real estate investment, an index constructed by Golub (2009) reveals that Turkey has more restrictions than OECD countries but less restrictions than non-OECD countries (Gholipour et. al., 2014). All in all, after the decisions of 24<sup>th</sup> of January 1980 and the cancellation of reciprocity principle, Turkey has become a more open country in the field of real estate sector as well.

**The Methodology**

In our analysis, since we are trying to find out the determinants of FDIRE, cointegrated vector autoregression (CVAR) method is utilized. CVAR is a convenient method to determine the long-run dynamic effects of the variables when the variables are nonstationary and cointegrated. To this aim, first we have employed Johansen and Juselius (1990) cointegration method to see whether there is a long-run relationship between the variables. The model can be formulated as a vector autoregression (VAR) model with  $k$  lags, as in the following.

$$X_t = \mu + \sum_{i=1}^k \theta_i X_{t-i} + \varepsilon_t \tag{1}$$

Here  $X_t$  is the vector of variables which are assumed to be nonstationary (integrated of order one  $I(1)$ ),  $\varepsilon_t$  is the vector of white noise errors with zero expected value and zero covariance.  $\mu$  and  $\theta_i$  represent respective parameters of constant and endogenous variables.

Given a  $VAR(k)$  model of  $I(1)$  variables (equation 1), a vector error correction model (VECM) form can be stated as in the following

$$\Delta X_t = \mu + \Pi X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \varepsilon_t \tag{2}$$

Where  $\Pi = -I + \sum_{i=1}^k \theta_i$  which is called long-run coefficient matrix,  $\Gamma_i = -\sum_{j=i+1}^k \theta_j$  which is called short-run coefficient matrix,  $\mu$  is the deterministic component (a drift), and  $\varepsilon_t$  is a white noise error vector with zero mean and the variance covariance matrix of  $E(\varepsilon_t \varepsilon_t') = \Sigma$ .

If the rank of  $\Pi$  ( $k \times k$ ) matrix is 0 ( $r=0$ ), there is no a linear combination of the  $I(1)$  variables which is stationary, i.e. the variables are not cointegrated. If  $\Pi$  matrix has full rank ( $r=k$ ), all of the elements of  $X_t$  are stationary. If  $\Pi$  has reduced rank ( $r < k$ ) then it can be expressed as  $\Pi = \alpha \beta'$  where  $\beta$  is cointegrating vector which contains  $r$  linear independent cointegrating vectors and the components of  $\alpha$  are the adjustment parameters. Johansen and Juselius (1990) offers maximum eigenvalue and trace tests to check the rank of  $\Pi$  matrix via its eigenvalues (characteristic roots). Here, trace test, tests the null hypothesis that the rank of  $\Pi$  is equal to or less than  $r$  against a general alternative (more than  $r$ ), while maximum eigenvalue tests number of cointegrating vectors is  $r$  against an alternative of  $r+1$  (Enders, 2015, p. 379; Brooks, 2014, p. 387).

Thus, if  $\Pi$  has reduced rank, since it can be decomposed as  $\Pi = \alpha \beta'$ , the VECM or CVAR model can be written as

$$\Delta X_t = \mu + \alpha \beta' X_{t-1} + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \dots + \Gamma_{k-1} \Delta X_{t-k+1} + \varepsilon_t \tag{3}$$

where  $\beta' X_{t-1}$  is a vector of stationary integration relations. If  $X_t \sim I(1)$ , all stochastic components are stationary in the above model (3). In this model (3), the rank of  $\Pi$ , in other words the number of cointegrating vectors will be determined by the likelihood ratio test utilizing the Johansen methodology (Juselius, 2006, s. 80).

**Data and The Variables**

This paper uses monthly data covering the period from 2003:01-2016:12. The data are collected from various resources including REIDIN, Central Bank of Republic of Turkey (CBRT), Turkish Statistical Institute (TurkStat), Istanbul Stock Market (Borsa Istanbul, BIST) and IMF. All variables are used in their natural logarithmic form, the vector of endogenous variables ( $X$ ) can be stated as follows

$$X_t = [FDIRE_t, HPRI_t, HRENT_t, RER_t, Tourist_{t-12}, REPO_t, PROD_t] \tag{4}$$



where *FDIRE* represents foreign direct investment in real estate which is converted from US dollars to Turkish liras (TL), *HPRI* and *HRENT* represent house price index and house rent index in Turkey respectively. These variables are in real terms, deflated by consumer price index (CPI) taken from IMF. *Real exchange rate (RER)* is defined as exchange rate basket/TL which means an increase in *RER* states appreciation of domestic currency (TL). *Tourist* defines the number of incoming tourists of the previous year which is seasonally adjusted using Census X-12 procedure, *REPO* denotes real REPO index and finally *PROD* represents seasonally adjusted industrial production index (see Table 1). Although GDP per capita has been employed in the majority of the analysis on foreign direct investment, industrial production index has been utilized as an indicator of economic activity since it is available with monthly frequency. The calculation method of GDP in Turkey has changed for two times during the analysis period, this provides another justification for the use of industrial production index.

**Table 1**

*The Data and Variables*

Variables	Description	Source
FDIRE	Real foreign direct investment in real estate (in million TL)	CBRT
HPRI	Real residential sales price index	REIDIN
HRENT	Real residential rent price index	REIDIN
RER	Real exchange rate index (exchange rate basket/ TL)	CBRT
Tourist	Seasonally adjusted number of incoming tourists with 1 year lag	TurkStat
REPO	Real REPO index	BIST
PROD	Seasonally adjusted industrial production index	IMF

An increase in RER, which implies appreciation of domestic currency, might cause a decrease in the level of FDIRE due to the house price increase from the foreigners' perspective. But on the other hand, weak domestic currency may be a signal of weak economy for foreigners. In that case, FDIRE can rise due to an increase in RER. Furthermore, if there is a positive relationship between HPRI and HRENT, an increase in RER might result in an increase of HPRI for foreign investors,

leading to an increase in FDIRE since the rental income of the house raises.

The effect of number of tourists on FDIRE has been paid attention to by many researchers (Rodriguez and Bustillo, 2010; Ghoulipour and Masron 2011; Gholipour, 2013; Poon, 2017) in the literature. Following Rodriguez and Bustillo (2010), a positive relationship is expected between FDIRE and the number of tourists with one-year lag. Tourism is the first step of acquiring property since foreign tourists should have an idea about the host country's environment, attractiveness as a holiday destination, economic and social situation etc. before making real estate investment. Thus, tourists need some time to learn about the attractiveness of the host country. Therefore, the number of incoming tourists has been employed in the study with one-year lag.

### **Econometric Analysis**

Under the assumption that all of the variables are  $I(1)$ , if matrix has reduced rank in model (2), then the CVAR model can be constructed. Thus as a first step of CVAR model, the stationary properties of the variables in (4) should be analyzed. To this aim, Augmented Dickey Fuller (ADF) (Dickey & Fuller, 1981) and Philips-Perron tests (PP) (Philips & Perron, 1988) are employed<sup>1</sup>. The results of both ADF and PP tests for intercept, for trend and intercept and for none equation specifications are represented in Table 2. As seen in Table 2, ADF and PP results are conflicting for *FDIRE* and *Tourist* variables. Also *REPO* variable looks stationary for intercept equation specification. But KPSS test indicates that all of these variables are non-stationary for their level values. Hence all of the variables are assumed to be  $I(1)$ .

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1 To check the stationary of the variables, also Kiwiatkowski-Philips-Schmidt-Shin (KPSS) test is employed which are not shown to preserve space, and the results are in parallel with the ones in the table.

**Table 2**

*Results of ADF and PP Unit Root Tests*

Variable	Specification	ADF		PP	
		Level	First Difference	Level	First Difference
FDIRE	Intercept	-3.419**	-8.853***	-1.729	-16.130***
	Trend and Intercept	-2.988	-9.061***	-2.932	-15.998***
	None	2.068	-8.449***	0.622	-15.957***
HPRI	Intercept	-1.089	-3.969***	-0.969	-7.002***
	Trend and Intercept	-0.325	-7.428***	-0.399	-7.545***
	None	0.177	-3.977***	0.033	-7.023***
HRENT	Intercept	-1.782	-6.570***	-1.341	-6.519***
	Trend and Intercept	-1.693	-6.559***	-1.332	-6.497***
	None	0.926	-6.499***	0.961	-6.495***
RER	Intercept	-2.718*	-9.749***	-2.845*	-9.652***
	Trend and Intercept	-3.409*	-9.912***	-3.270*	-9.739***
	None	0.009	-9.780***	0.030	-9.690***
Tourist	Intercept	-1.908	-18.674***	-2.670*	-24.313***
	Trend and Intercept	-3.276*	-18.702***	-5.226***	-26.877***
	None	1.798	-18.452***	2.843	-19.951***
REPO	Intercept	-4.159***	-8.970***	-4.943***	-9.066***
	Trend and Intercept	-2.671	-9.775***	-2.855	-9.489***
	None	1.777	-8.717***	2.223	-8.840***
PROD	Intercept	-1.220	-15.302***	-1.018	-15.255***
	Trend and Intercept	-2.484	-15.285***	-2.484	-15.246***
	None	2.982	-14.631***	2.807	-14.528***

**Note:** \*, \*\* and \*\*\* indicate significant at 10, 5 and 1% respectively. The lag length of ADF test indicated according to Schwarz Info Criterion (SIC) and the

bandwidth of PP test indicated according to Newey-West statistic utilizing Bartlett kernel.

Therefore, we proceed to Johansen cointegration test. Cointegration test results are given in Table 3. According to trace and maximum eigenvalue tests, three and two cointegrating vectors are suggested respectively at 5% significance level. For 1% significance level, the number of cointegrating vectors is two. Based on these results, VECM is constructed assuming three cointegrating vectors in this study<sup>2</sup>.

Table 4<sup>3</sup> reports findings of the error correction model. Error correction term for *FDIRE* is found to be negative and significant. It means that if long term relation distorts, it will be recovered in the short run. In other words, the long run relationship of *FDIRE* and the other variables will be restored in the short run due to a divergence from the long run equilibrium.

**Table 3**

*Johansen Cointegration Test Results*

Trace Test					
H0	H1	Eigenvalue	Trace Statistic	0.05 Critical Value	P-value
r=0	r≥1	0.374	207.266***	125.615	0.000
r≤1	r≥2	0.294	130.107***	95.754	0.000
r≤2	r≥3	0.179	72.69**	69.819	0.029
r≤3	r≥4	0.117	40.18	47.856	0.216
r≤4	r≥5			29.797	
r≤5	r=6			15.495	

2 When two cointegrating vectors are assumed in the VECM, there is no considerable change in the results. Also impulse-response functions generated from VECM with two cointegrating vectors are in line with the ones generated from the VECM with 3 cointegrating vectors used in this study.

3 In the VECM lag length is taken 2, which is indicated according to SIC and Han-na-Quinn information criterion. According to Akaike information criterion lag length is 3. But there are no any major differences in the results if lag length is taken 3.

Maximum Eigenvalue Test					
H0	H1	Eigenvalue	Max. Eigen. Statistic	0.05 Critical Value	P-value
r=0	r=1	0.374	77.16***	46.231	0.000
r≤1	r=2	0.294	57.416***	40.078	0.000
r≤2	r=3	0.179	32.502*	33.877	0.072
r≤3	r=4	0.078	20.476	27.584	0.3091

**Notes:** Restricted intercepts and no trend specification is used in the estimation of the VAR model. Optimum number of lags are determined by Schwarz Information Criterion. \*, \*\* and \*\*\* indicate significant at 10, 5 and 1% respectively.

**Table 4**

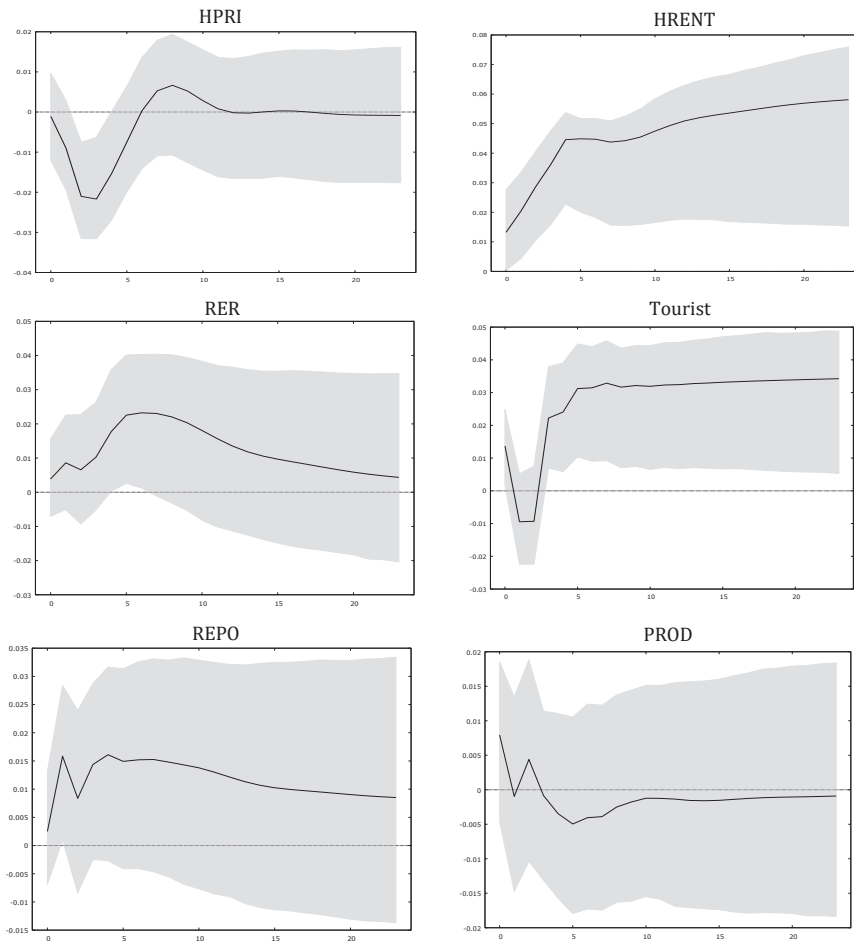
*Error Correction Model*

Regressor		St. Errors
$\Delta$ FDIRE <sub>t-1</sub>	-0.116	0.075
$\Delta$ FDIRE <sub>t-2</sub>	0.01	0.072
$\Delta$ HPRI <sub>t-1</sub>	-5.161	3.192
$\Delta$ HPRI <sub>t-2</sub>	-1.778	3.223
$\Delta$ HRENT <sub>t-1</sub>	8.103**	3.407
$\Delta$ HRENT <sub>t-2</sub>	2.651	3.375
$\Delta$ RER <sub>t-1</sub>	-0.337	0.302
$\Delta$ RER <sub>t-2</sub>	-0.504	0.318
$\Delta$ Tourist <sub>t-1</sub>	-0.788***	0.145
$\Delta$ Tourist <sub>t-2</sub>	-0.762***	0.135
$\Delta$ REPO <sub>t-1</sub>	-2.406	3.446
$\Delta$ REPO <sub>t-2</sub>	-3.067	3.072
$\Delta$ PROD <sub>t-1</sub>	-0.030	0.373
$\Delta$ PROD <sub>t-2</sub>	0.127	0.362
C	0.008	0.009
$\text{ecm}(\text{FDIRE})_{t-1}$	-0.329***	0.055
$\text{ecm}(\text{HPRI})_{t-1}$	0.951***	0.177
$\text{ecm}(\text{HRENT})_{t-1}$	-0.071	0.104

The further interaction among the variables is investigated utilizing the generalized impulse response functions and forecast error variance decompositions based on the CVAR in equation (3). The responses of foreign direct investment in real estate (FDIRE) to the other variables for 24 months horizon are presented in Figure 1. In each figure, solid line represents response of FDIRE to the variables indicated at the top of the graphs and also grey shaded area shows the 90 % bootstrap confidence intervals.

**Figure 1**

*Responses of FDIRE to One-Standard Deviation Shocks*

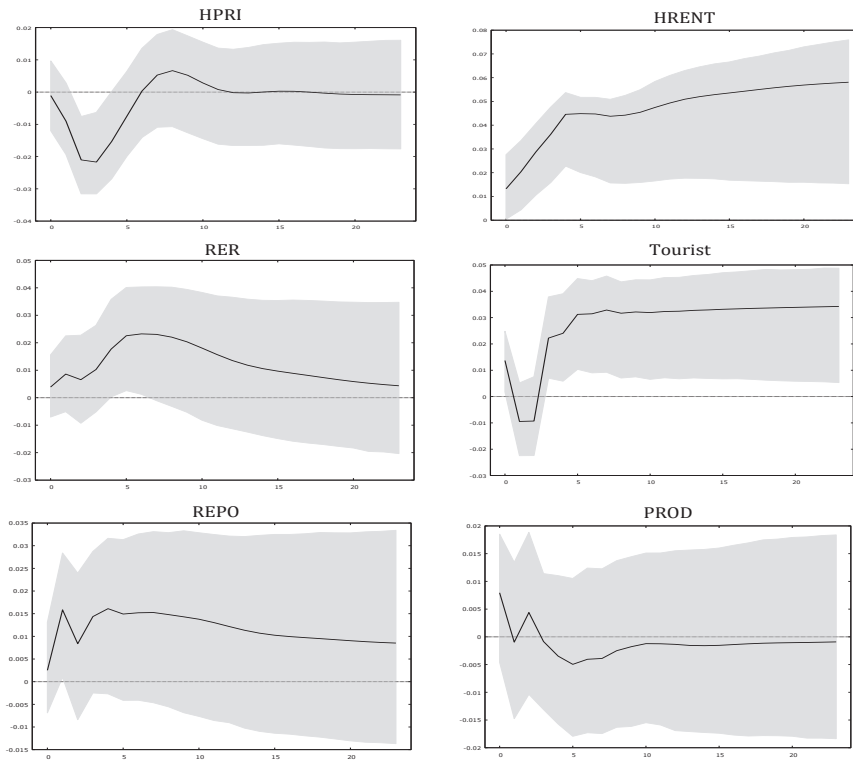


The results indicate that a positive shock to real house price index (HPRI) has a negative impact on FDIRE for a few first months, but after the 4<sup>th</sup> month, the response of FDIRE is statistically insignificant. An increase in real house prices might bring about to a decrease of the house demand of foreigners. But the results show that this effect is not permanent. On the other hand, in line with our expectations, real house rent index (HRENT) and one-year lagged number of incoming tourists (Tourist) have positive impact on FDIRE.

Although real exchange rate (RER) innovation exhibits a positive impact on FDIRE, this impact is statistically significant only in between the 4<sup>th</sup> and the 6<sup>th</sup> months. Since an increase in RER represents the appreciation of the domestic currency, strong TL has a positive but statistically weak impact on FDIRE. This may be due to the perception that the strong TL points to a strong economy by foreigners.

**Figure 2**

*Responses of HPRI to One-Standard Deviation Shocks*

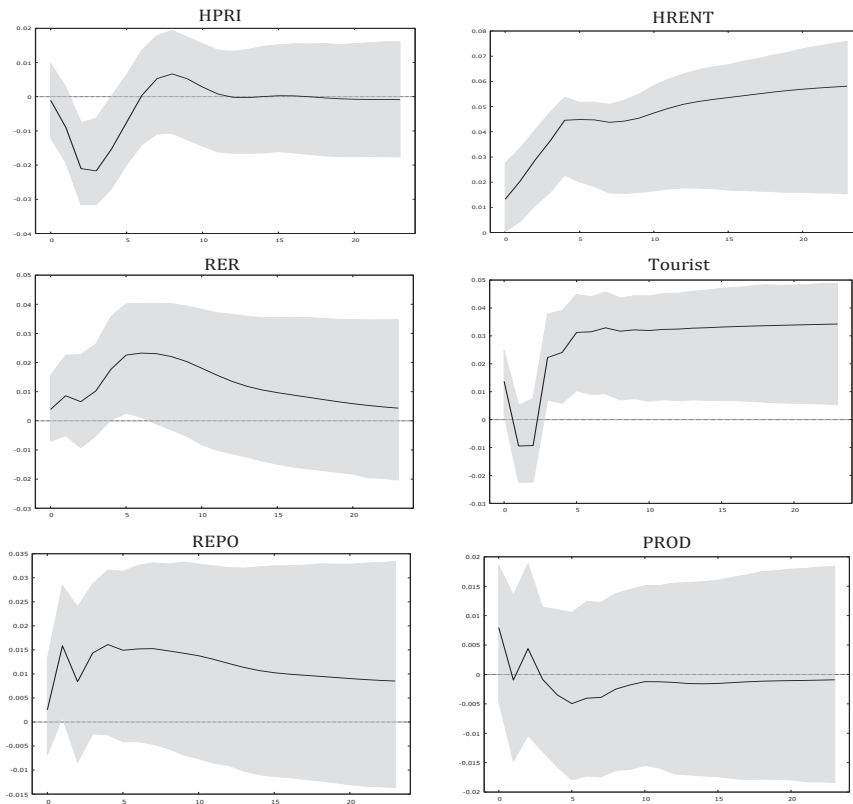


The responses of real house price index are seen in Figure 2. As expected, real house rent index is the most influential variable affecting HPRI. As the rental income of houses rise, housing would become a more attractive field of investment which in turn leads to an increase of demand and the price in the housing market. The responses of HPRI to one-year lagged tourist and industrial production shocks are statistically insignificant.

Our results suggest that FDIRE has a positive but weak impact on HPRI. In the literature, while some studies claim that FDIRE leads to increase in house prices, some has no evidence in favor of this argument since the share of FDIRE is negligible in the real estate sector. Another remarkable finding is that REPO innovation has positive impact on HPRI for the first 11 months.

**Figure 3**

*Responses of HRENT to One-Standard Deviation Shocks*





In Error! Reference source not found., the determinants of real house rent are analyzed. Findings imply that real house rent is positively affected by an increase in REPO. A rise in REPO refers an increase in capital return, implying a surge in house rent which is the yield of house as capital. Since purchasing of dwellings is generally considered as an investment for foreign investors, as the return of capital increases in the market, landlords would tend to request a higher house rent.

FDIRE has slightly positive impact on HRENT. On the other hand, real exchange rate innovations, in other words appreciation of domestic currency (TL) has a tiny negative effect on HRENT which is statistically significant after 9<sup>th</sup> month for 90 % confidence interval. By the same token, depreciation of domestic currency causes an increase in HRENT. This result is not surprising in Turkey since especially in the luxury residences the rental fee was explicitly determined in US dollars or euros in the tenancy contracts until the amendment of law in mid-2018<sup>4</sup>. Although it has become obligatory to determine the rental price in terms of Turkish lira in the tenancy contracts after the introduction of the law, exchange rate is still taken into account in determining the annual increase rate of rents. As a result, this implies that the tenancy contracts are still implicitly in terms of foreign currency in Turkey.

Although a positive shock to HPRI has a negative impact on HRENT at first, this impact shades after the 3<sup>rd</sup> month. This is in contrast with our expectations since as the price of house increases one may expect an increase also in its rent. However it seems that there are other main determinants in the Turkish housing markets affecting house rent. On the other hand, the innovations to Tourist and PROD have statistically insignificant impacts on house rent.

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4 See Official Gazette (2018), law no: 30557

**Table 5**

*Variance Decompositions*

Variance Decomposition of FDIRE								
Period	S.E.	FDIRE	HPRI	HRENT	RER	Tourist	REPO	PROD
1	0.101	95.033	0.013	1.935	0.167	2.083	0.07	0.7
4	0.145	71.176	5.28	14.453	1.261	4.551	2.834	0.446
8	0.201	44.019	3.642	29.484	5.907	12.423	4.103	0.422
12	0.248	35.436	2.546	35.326	6.582	15.675	4.134	0.301
16	0.291	31.302	1.854	40.302	5.497	17.143	3.671	0.231
20	0.33	28.948	1.436	43.805	4.503	17.903	3.221	0.185
24	0.368	27.441	1.161	46.357	3.722	18.311	2.856	0.153
Variance Decomposition of HPRI								
Period	S.E.	FDIRE	HPRI	HRENT	RER	Tourist	REPO	PROD
1	0.008	0	7.467	4.472	0.03	0.008	87.588	0.435
4	0.02	0.52	9.986	18.579	0.299	1.001	68.59	1.025
8	0.035	2.001	11.033	36.116	2.484	2.41	44.205	1.749
12	0.051	3.668	8.819	45.361	7.118	3.215	29.672	2.146
16	0.067	4.902	6.93	49.199	11.537	3.742	21.393	2.297
20	0.083	5.747	5.618	50.525	14.874	4.169	16.682	2.385
24	0.098	6.331	4.748	50.717	17.254	4.566	13.919	2.465
Variance Decomposition of HRENT								
Period	S.E.	FDIRE	HPRI	HRENT	RER	Tourist	REPO	PROD
1	0.008	0	0	10.822	0.039	0.077	88.982	0.081
4	0.022	0.411	3.81	36.75	1.025	0.354	56.623	1.027
8	0.039	1.804	1.454	55.258	6.247	0.679	33.5	1.058
12	0.058	3.17	0.668	62.359	11.221	0.909	20.451	1.222
16	0.078	4.157	0.38	64.298	15.618	1.038	13.301	1.208
20	0.097	4.822	0.264	64.476	18.769	1.129	9.356	1.183
24	0.116	5.281	0.213	64.077	21.04	1.201	7.03	1.158

Forecasted error variance decompositions of FDIRE, HPRI and HRENT are presented in Table 5. At the earlier forecast horizons most

of the variation in the FDIRE is explained by its own shock, however the explanatory power of the remaining shocks has risen considerably when the forecast horizon is increased. At the 24<sup>th</sup> month, HRENT has accounted most of the variation in FDIRE with 46.36 percent, this is even greater than the forecast error explained by the own shock of the variable (with 27.44 percent). Tourist also explains a considerable portion of the variation in FDIRE (with 18.31 percent). The explanatory power of the remaining variables is found to be less significant.

It is noticeable that in the variance decomposition of HPRI, HRENT is more explanatory than HPRI itself with 50.72 percent. That is, housing prices are mainly determined by house rent. Also, RER and REPO are important variables in explaining the forecast error variances of HPRI with 17.25 percent and 13.92 percent respectively.

Most of the forecast error variance of the HRENT is explained by its own shock (with 64.08 percent), followed by RER with 21.04 percent of the forecast error variance in HRENT. Also the contribution of REPO and FDIRE shocks on the forecast error variance of HRENT is not negligible.

To sum up, the results of forecasted error variance decompositions corroborate the findings obtained from impulse-response functions. The findings of the analysis suggest that the number of one-year lagged tourist arrivals and real house rent are the most important and significant determinants of foreign direct real estate investment in Turkey. When it comes to the determinants of real house price and real house rent, the results imply that house rent is the most important determinant of house price among the others. Since tenancy contracts are mostly prepared implicitly in US dollars or Euros, one of the most important determinants of house rent is real exchange rate. Hence, as domestic currency depreciates, housing rent price increases. REPO is also another important determinant of house rent which can be interpreted as an opportunity cost of housing investment.

## **Conclusion**

The main goal of the study is to examine the determinants of foreign direct investments in Turkish real estate sector. Also the determinants of house prices and house rents have been analyzed. To this aim, we estimate a vector error correction model (VECM) covering the period of 2003:1 – 2016:12. Utilizing the impulse-response functions and forecast error variance decompositions based on CVAR, the interactions

among foreign direct investment in real estate (FDIRE), real residential sales price index (HPRI), real residential rent price index (HRENT), real exchange rate (RER), number of one-year lagged tourist arrivals (Tourist), real REPO index and industrial production index (PROD) have been examined in the study.

Results imply that the main determinants of foreign direct investment in real estate are house rent and number of one-year lagged tourist arrivals. In line with the findings of the most of the studies (Rodriguez and Bustillo, 2010; Ghoulipour and Masron 2011; Gholipour, 2013) in the literature, the tourism activity triggers FDIRE positively. Also, in our study, an increase of house rent rises FDIRE as expected. Empirical findings of both impulse-response functions and variance decompositions suggest that house rent is the most remarkable variable affecting FDIRE. Furthermore, an increase in real exchange rate (appreciation of TL) has a weak and positive effect on foreign direct investment in real estate sector.

One of the main findings of this study is that an increase in real house rent rises real house price level. Also an increase in FDIRE has a positive but weak impact on real house prices, implying that the foreigners have no considerable effect on housing market. Another remarkable finding of the study is that real house rent is mainly determined by real exchange rate and REPO. The decrease in real exchange rate, implying depreciation of domestic currency, rises real house rent since most of the tenancy contracts were prepared in foreign currency before 2018. REPO shocks have a positive and significant impact on house rents. Since REPO can be interpreted as an opportunity cost of housing investment, landlords may respond to increases in this variable by rising the rental price of houses in order to compensate their possible losses.

Empirical results imply that tourism is an important sector by means of attracting FDIRE in Turkey. From this point of view, the contribution of tourism sector to the economy is not only limited by the expenditures of the tourists since it can stimulate real estate investments to host country. Hence policy makers would better to pay more attention to tourism sector.

Due to data unavailability, analyzing of the link between FDIRE at regional level and macroeconomic indicators is not possible at present. As a further study, it might be considered to investigate the nexus between FDIRE and macroeconomic indicators at regional level.

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