

DETERMINANTS OF HOUSE PRICES IN TURKEY: COMPARATIVE ANALYSIS OF DEVELOPMENT REGIONS

Ibrahim Yasar Gok

Asst. Prof. of Finance, Suleyman Demirel University, Faculty of Economics and Administrative Sciences,
Department of Banking and Finance, Isparta/TURKEY

Arif Keceli

Asst. Prof. of Geography, Mehmet Akif Ersoy University, Faculty of Science and Letters, Department of
Geography, Burdur/TURKEY

Abstract

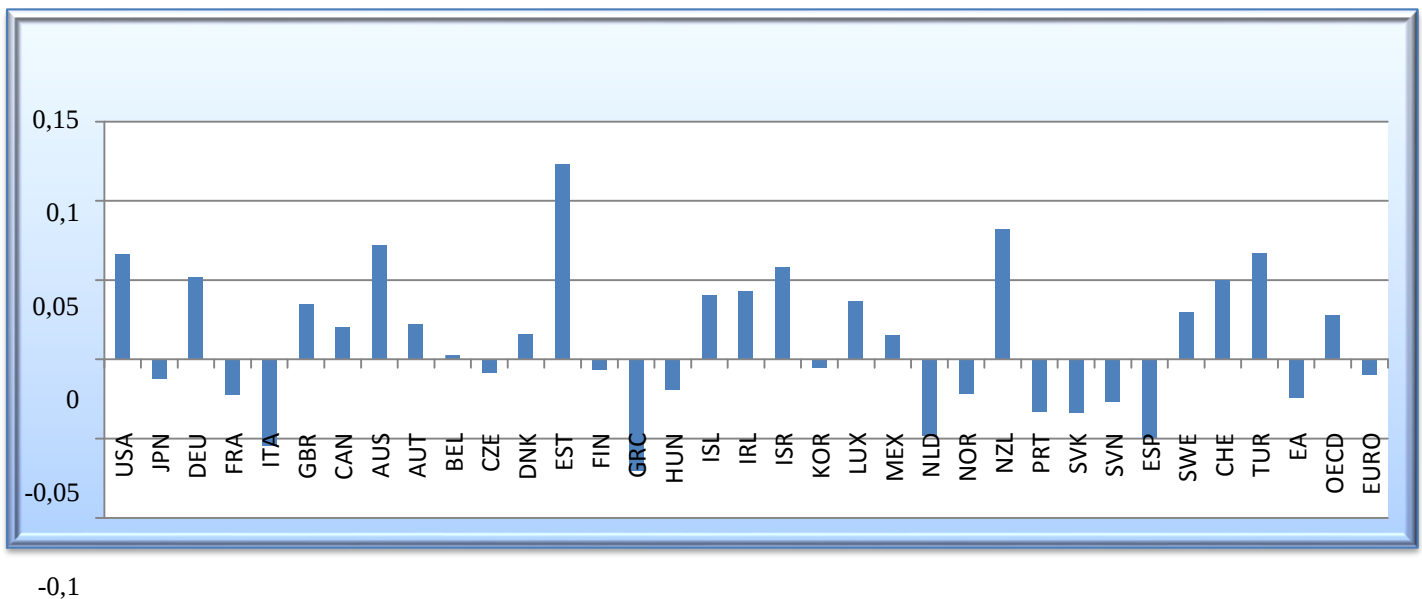
High house prices are one of the major issues both in developed and developing countries especially whether house prices are formed bubbles or in line with fundamentals. According to OECD nominal and real house prices indices for the period 2012:Q4 and 2013:Q4, Turkey is in the second and fourth places respectively for house prices increasing rate between OECD countries. In this period, while Turkey's real house prices increasing rate is 6.68%, the OECD's average is just 2.8%. Also, according to Central Bank of Turkish Republic database, between 2014-2015 house prices in Turkey increase 15%. Based on these indicators, primary research question of this study is what are the influential factors underlying these high ratios? This study is focused on fundamentals of macro indicators. Determinants of house prices in Turkey are examined both in national and its 26 development regions level. Annual house prices changes between 2014-2015 for both national and regional levels are explained by national/regional agriculture, industrial, and service sectors gross value added (GVA), national/regional net population change, national/regional first and second-hand house sales, national/regional real house rent inflation rate, national/regional GVA per capita, net domestic migration to/from regions, and regional bank deposit/national bank deposit ratio. Ordinary least squares and stepwise regression models are used to explore the affecting factors of house prices. According to regression results, it is found that GVA per capita and net domestic migration are the most important drivers of house prices.

Key Words: House Prices, Macro Factors, Development Regions, Turkey

1. Introduction

High inflation in house prices is one of the questioned issues in Turkey especially in some development regions. According to OECD house prices data, Turkey's real house inflation rate is continually positive till second quarter of 2012. Also, according to Central Bank of Turkish Republic, some of the development regions' real house inflation rates are much higher than Turkey's average. High inflation in house prices is not only the problem of developing countries like Turkey, it is also one of the major problems in developed countries. According to OECD, Australia, New Zealand, US, and Germany's real house prices inflations are above 5% in 2012-2013 period.

As can be seen in Figure 1. Turkey is in the fourth place in real house prices increase within OECD countries for 2012:Q4-2013:Q4 period. In this period, while Estonia is in the first place, New Zealand, and Australia come after, respectively. Also, while Turkey's annual real house prices increase is 6.68%, OECD average increase rate is 2.80%, Eurozone average increase rate is -0.9%, and US increase rate is 6.63%.

Figure 1. OECD Countries Real House Prices Changes (%) between 2012:Q4 – 2013:Q4

*Note: Real House Prices Changes (%) are calculated from OECD Real House Prices Index data.

Determinants of house prices can be classified as micro and macro factors. Micro factors are house and house environment characteristics affecting house prices and macro factors are socio-economic factors affecting house prices. This is the first study examining the macro dynamics of house prices in Turkey and its statistically classified regions. Although Selim (2009) examined the determinants of house prices in Turkey, he focused on micro factors like some of the house characteristics such as number of rooms, house size, age of building, having swimming pool, a jacuzzi, elevator, central heating system, and house environment characteristics such as being closer to the center of education and banking services, parking opportunities and etc. He obtained data from Turkish Statistical Institute 2004 Household Budget Survey. Also, Özsoy and Şahin (2009) and Ebru and Eban (2011) examined house prices determinants in Istanbul, Turkey in the perspective of micro factors. On the other hand, this study focused on macro factors and used fundamental socio-economic factors affecting house prices such as real house rent inflation rate, agriculture sector gross value added, industrial sector gross value added, service sector gross value added, total first and second hand house sales, gross value added per capita, net domestic migration, net population change, and regional bank deposit/national deposit ratio.

Turkish Statistically Regional Classification (Turkish SRC) was accepted in 2002. There are three kinds of SRC classification. In SRC-1 there are 12 regions and in SRC-2 there are 26 sub-regions in Turkey.¹ These regions and sub-regions are just for statistical classification. These regions do not have administrative aspects. On the other hand, 26 development agencies were established at SRC-2 level after 2006 (Figure 2.). These SRC-2 level regions have one to six provinces within the responsibility area depending on the size, capacity and potential. The main purpose of establishing development regions may be summarized as accelerating socio-economic development and increasing local capacity within the borders of each region by using local dynamics. Theoretically, the idea of supporting local development by local power is favorable. However, some of those regions are in a disadvantageous position because of their geographic, demographic, cultural and socio-economic features. This is the main reason that this study is focusing on comparison between development regions besides investigating determinants of house prices in the country. This comparison is also helping to find out main differences between regions based on study indicators for house prices. It is assumed that there are remarkable distinctions between eastern and western regions because of the amount of public and private investments, socio-political structures and policies of central and local governments. In

¹ In SRC-3 level, there are 81 provinces. These provinces have governors appointed by central government at province level. There are locally elected mayors in central counties of provinces and also in all other counties.

general, west part of the country is more developed than east part. The comparison in this study is making these differences more visible by the house prices determinants and study parameters. As internal migration from east to west is a reality in the country because of socio-economic reasons and housing is one of the primary problem for newcomers (Vanclay, 2002), this parameter is added into analysis. General characteristics of regions are given in appendix.

Figure 2. Development Regions of Turkey

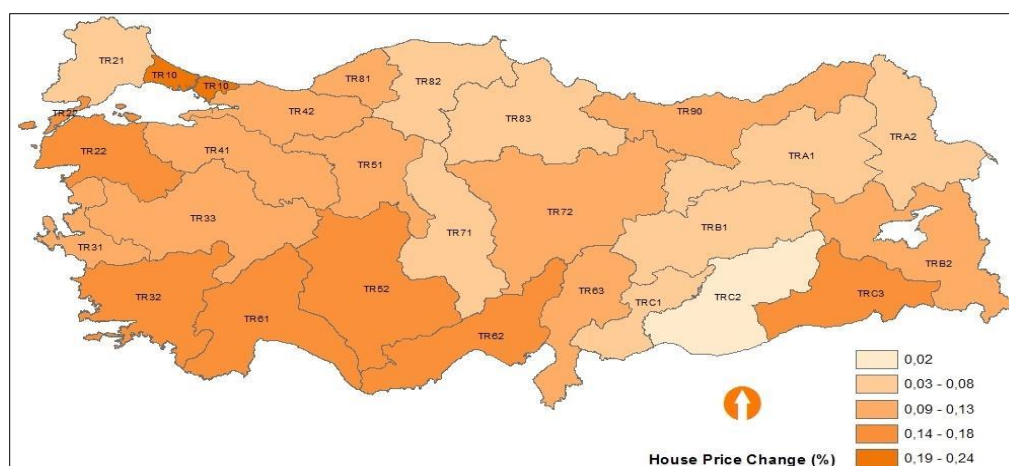


* Istanbul, Ankara and Izmir are unique in terms of development regions. As they are three major provinces of the country and have largest population and greatest economy, there is no other province in their development regions.

Figure 3. shows annual house prices changes (%) between 2014 and 2015 based on regions. TR32, TR61, TR52, TR62, TR22 and TRC3 are classified in second highest rank of house price changes, as there are remarkable developing provinces within their borders, such as Balıkesir, Konya, Mersin, Denizli, Antalya, and Aydın. TRC3 has specific condition in this case. As it has been on national and international media, some refugees from Syria settled in the area close to border. This may have a strong impact on house price in this region. TRC2 have lower value, although it locates in the same area. Sanliurfa and Diyarbakır are only provinces within the border of this region. These two provinces have relatively high urbanization rank and have more residential building compare to TRC3 provinces.

2. Literature Review

Himmelberg, Mayer, and Sinai (2005) argue that the factors affecting house prices can be bubbles, fundamentals or misperceptions. Fundamentals are socio-economic variables such as income, construction costs, interest rates, housing rental prices, total house sales, or demographic factors like population, migration and etc. Bubbles and misperceptions are the intangible context of house prices inflation. Housing bubbles mean that house prices increase dramatically and eventually it cannot be affordable, then it declines sharply. Although identifying housing bubbles is not easy, they are subject to burst eventually, so they are one of the most feared aspects of house prices inflation. If we think that the last global financial crises in 2007-2008 is related to the bursting real estate bubble in US, their damage on world economy is not easy to measure. If we assume that there are no misperceptions and bubbles, fundamentals have to explain almost all of the variations in house prices.

Figure 3. Turkey's House Prices Changes (%) based on Regions

On European countries, Egert and Mihaljek (2007) studied on determinants of house prices dynamics in Central and Eastern Europe (CEE) and 19 OECD countries using panel dynamic OLS estimator and they concluded that conventional fundamental factors such as GDP per capita, real interest rates, credit growth, demographic factors and also some transition-specific factors like indicators of institutional development of housing markets and housing finance are statistically significant drivers of house prices in CEE. Stepanyan, Poghosyan, and Bibolov (2010) studied house prices determinants in former Soviet Union countries using panel data analysis performed by pooled mean group. They found that fundamentals such as GDP, workers' remittances and foreign inflows are important indicators for house prices and also house prices are in line with their fundamentals indicating that house prices are not formed bubbles. Galati, Teppa, and Alessia (2011) examined micro and macro factors in determining house prices in Netherland using panel model and they found that long term interest rate, short term interest rate, inflation rate, unemployment rate, and old-age dependency ratio are all significant (at 1% level) macro variables that determine house prices without micro variables in the analysis. Panagiotidis and Printzis (2015) examined the determinants of Greece housing market using VECM analysis and they reached that retail sector and mortgage loans are the main determinants for the variations of house prices. Another research about housing prices is focused on the impacts of ruling parties' urban policies and their effects on land and house prices in Spain. Sole-Olle and Viladecans-Marsal (2013) concluded their study by strong correlation between partisan differences and house prices growth.

On US, Lastrapes (2002) examined the relationship between real prices of housing and money supply shocks using VAR model and he found that real housing prices and both first and second hand house sales increase in response to positive money supply shocks in the short-run. Mikhed and Zemcik (2009) examined that whether declined US house prices after 2006 bursting of house prices bubble is justified by fundamentals like income, building cost, house rental rate, population and etc. They used univariate and panel cointegration tests and evidenced that before 2006, the US house prices were not in line with fundamentals and there was a house prices bubble. Also, they found that after 2006, the declining US house prices is not sufficient and it may take decades to return to the fundamental value. Clark and Coggin (2011) studied the relationship between house prices and fundamental economic variables using cointegration tests for the period of 1975 – 2005 which is before the bursting US house prices bubble. They concluded that there is no cointegration relation between house prices and the economic variables in this period even allowing structural break which indicates the presence of bubble causing housing market collapse.

On China, Du, Ma and An (2011) investigated the relationship between housing and land prices in Chinese cities of Shanghai, Tianjin, Beijing, and Chongqing using panel cointegration and causality tests. They reached that there is a long-run relationship between housing and land prices, on the other hand for the short-run there is unidirectional causality from house prices to land prices. Li and Chand (2013) examined the fundamentals of house prices in 29 Chinese provinces using panel data model and they reached that income, building costs, land prices, user costs, and impending marriages are the main drivers of house prices. Wen and Goodman (2013) examined the relationship between urban land prices and house prices in 21 provincial cities using a simultaneous-equations model in which urban land prices and house prices are endogenous variables and five variables for land prices and seven variables for house prices are exogenous variables. They reached that there is an interrelationship between land prices and house prices, also disposable income has an important effect on both variables, besides lagged house prices is the main driver for house prices.

The relationship between urbanization and housing growth is widely recognized. Liu, Bao, and Xue (2014), mentioned on this interrelation in the case of Jiangxi in China. Their indicators are urbanization level, average house prices and consumer price index. They found out long-term balanced relationship between these two concepts by using correlation analysis, unit root test, Johenson cointegration test and Granger causal test. Wang (2012) attracted attentions on same problem in large Chinese cities and focused on increasing land consumptions and spatial movements of housing development in and around large and small cities.

3. Data and Methodology

House prices index data is obtained from Central Bank of Turkish Republic which calculate house prices index month by month starting January, 2014 at national and SRC-2 regional levels. In the study, 2014 annual house price index change (%) for national and SRC-2 regions levels are used. Because there is not any other house prices indicator in Turkey and also central bank has started to calculate house prices index after 2014, we have to consider only 2014 annual data.

In the study, annual house prices changes are explained by national/regional real house rent inflation rate, national/regional agriculture sector gross value added, national/regional industrial sector gross value added, national/regional service sector gross value added, national/regional total first house sales, national/regional total second hand house sales, national/regional gross value added per capita, regional net domestic migration, national/regional net population change, and regional bank deposit/national deposit ratio.

All of the explanatory variables are obtained from Turkish Statistical Institute (TSI) except regional bank deposit/national deposit ratio which is available for 2013 and obtained from Banks Union of Turkey. Annual national/regional agriculture, industry and service sectors gross value added data are just available till 2011. To derive 2014 values, national gross valued added/GDP ratio of 2011 is calculated and then using this ratio, 2014 national gross value added is estimated from 2014 national GPD which is available at Turkish Statistical Institute. After 2014 national gross value added estimation, regional gross value added shares in national level are adjusted as take part in 2011. By doing this, it is supposed that regional shares in national level have not changed since 2011.

Annual national/regional net population change, annual national/regional total first house sales, annual national/regional total second hand house sales, annual net domestic migration, and annual regional bank deposit/national deposit ratio are all in the form of provinces level. So, they are converted into regional levels. Because only domestic migration -not foreign- is considered in the study, net domestic migration is zero at national level. In the study, housing credit level and building construction costs are not used as explanatory variables because they are not available at province or regional levels and also interest rate is not used because it does not differ within regions.

In the study, stepwise regression and OLS regression models are applied. Normally, the equation needs to be estimated with OLS model as seen below. But stepwise regression may remove some of the variables from model. Also, by applying OLS model we include only one of the highly correlated variables to the model.

$$\text{House Price Change (\%)} = c + c(1)*\text{Real House Rent Inflation} + c(2)*\text{Agriculture Sector GVA} + c(3)*\text{Industrial Sector GVA} + c(4)*\text{Service Sector GVA} + c(5)*\text{Total First House Sales} + c(6)*\text{Total Second Hand House Sales} + c(7)*\text{GVA per Capita} + c(8)*\text{Net Domestic Migration} + c(9)*\text{Net Population Change} + c(10)*(\text{Regional Bank Deposit})/(\text{National Deposit}) + \mu$$

Here, the signs of coefficients indicate the effects of direction. If the variables are statistically significant, positive sign means an increase in house price and vice versa.

4. Empirical Findings

Table 1. reports the descriptive statistics and correlation matrix of variables. As can be seen in Panel A, while house prices increase 15% in national level, maximum and minimum increases in regional level are 24%, and 2%, respectively. Real rent inflation rate in national level is 7.41% and the highest rate within regions is 15.23% and the lowest rate is 3.58%. National agriculture, industrial, and service sectors GVAs are \$70.1bn, \$214.1bn, and \$494.5bn, respectively. Turkey's 2014 total GVA is approximately \$779bn. Overall, the biggest share in total GVA is service sector GVA. In 2014, more than 1.1 million house sales occurred in Turkey, and first and second hand house sales are close to each other. Gross value added per capita for Turkey is almost \$10,000 and standard deviation for GVA per capita in regional level is \$3101.

Regionally, the biggest GVA per capita is \$14713 and the lowest one is \$3845. For domestic migration, the highest inflow of migration to a region from others is 40,009 and migration outflow from one region to another is 37,200. Turkey's population increased almost 1 million in 2014. Regionally, the highest increase in population is 217,000 and the decrease is 6,587. Regional bank deposit/national bank deposit ratios for regions differ each other sharply. The maximum ratio is 48% and the minimum ratio is 0.2%. This indicates the development difference of banking sector for regions.

In Panel B, the correlation matrix for variables is reported. House prices are correlated with all variables within the range of 18% and 43% except real rent inflation rate. The correlation between house prices and real rent inflation rate is just 2%. Service, industrial, and agriculture sectors GVAs are all highly correlated with each other. As it is seen, all of the correlation rates are above 94%. First house sales and second hand house sales are also highly correlated which is 99.9%. Service, industrial, and agriculture sectors GVAs are highly correlated with first house sales and second hand house sales. Besides, as it is expected, there is a high correlation for GVAs and regional bank deposit/national deposit ratio. Also as expected, net population change is highly correlated with GVAs, first and second hand house sales, and regional deposit/national deposit ratio. Because the population is located in highly developed regions, it is a natural result that there is a high correlation between net population change and other economic variables and also house sales. Overall, GVAs, first and second hand house sales, regional deposit/national deposit ratio, and net population change are all highly correlated with each other.

It is clear that some of the variables are highly correlated with each other. Hence, an important question arise that an ordinary least squares analysis with these variables is applicable or not. Generally, because of multicollinearity, interpreting the coefficients is very difficult. In some OLS models, it is observed that highly correlated variables have different signs with the presence of multicollinearity. There are several ways to handle multicollinearity problems such as applying principal component analysis or to remove one of the highly correlated variables from model. In this study, to overcome multicollinearity problem, firstly we applied stepwise regression model. Although stepwise regression model have some pros and cons, the availability of only 2014 data restricts applying other models. Stepwise regression model includes both forward and backward selection techniques. The variables are both added and removed for each step in the model. Forward selection technique starts with no variable in the model and backward selection technique starts with all the variables in the model. Forward selection includes the most significant variable to the model for each step till all the remaining variables have significance higher than α (alpha to enter) value. Backward selection removes the least significant variable from the model for each step till all the remaining variables in the model have significance lower than α (alpha to remove) value. In the study both α values are 0.05.

Table 1. Descriptive Statistics and Correlation Matrix

	House Price Index	National/Regional Real Rent Inflation Rate	National/Regional Agriculture Sector GVA	National/Regional Industrial Sector GVA	National/Regional Service Sector GVA	National/Regional Total First House Sales	National/Regional Total Second Hand House Sales	National/Regional Gross Value Added Per Capita	Regional Net Domestic Migration	National/Regional Net Population Change	Regional Bank Deposit/National Bank Deposit
Panel A: Descriptive Statistics											
Turkey	15%	7.41%	\$70.1bn	\$214.1bn	\$494.5bn	541554	623827	\$10025.19	0	1,028,040	100%
All Regions (26 Region)											
Mean	10.8%	7.44%	\$2.70bn	\$8.24bn	\$19bn	20829.00	23993.35	\$8666.37	0	39,500	3.8%
Median	10.97%	7.18%	\$2.73bn	\$4.39bn	\$10.3bn	16297.00	15856.50	\$7845.38	-8,301	36,438	1.2%
Maximum	24%	15.23%	\$5.3bn	\$57.9bn	\$153bn	102936.0	122518.0	\$14713.52	40,009	217,000	48%
Minumum	2%	3.58%	\$421mn	\$729mn	\$3.16bn	2.270.000	1.500.000	\$3845.32	-37,200	-6,587	0.2%
Std. Deviation	4.7%	2.19%	\$1.3bn	\$11.4bn	\$29.4bn	20270.24	26095.64	\$3101.29	21,625	46,259	9.6%
Panel B: Correlation Matrix											
House Price Index	1.000000	0.026269	0.189218	0.331766	0.355841	0.288964	0.302596	0.430622	0.367305	0.312007	0.426385
Real Rent Inflation Rate		1.000000	4.37E-05	-0.030461	-0.019282	-0.018829	-0.025724	-0.420524	-0.314417	-0.004580	-0.007235
Agriculture Sector GVA			1.000000	0.951095	0.941900	0.973798	0.969744	0.091172	0.021399	0.965967	0.871766
Industrial Sector GVA				1.000000	0.996963	0.994156	0.992911	0.271365	0.120109	0.991475	0.972501
Service Sector GVA					1.000000	0.991980	0.992320	0.264912	0.117298	0.990663	0.984061
First House Sales						1.000000	0.999002	0.221708	0.108059	0.996494	0.956461
Second Hand House Sales							1.000000	0.242032	0.131063	0.995642	0.959593
GVA Per Capita								1.000000	0.844484	0.219422	0.318653
Net Domestic Migration									1.000000	0.124237	0.145702
Net Population Change										1.000000	0.958403
Reg. Deposit/Nat. Deposit											1.000000

Secondly, we applied ordinary least squares model but just including one of the highly correlated variables in the model. As reported in Table 1. service, industrial, and agriculture sectors GVAs, first and second hand house sales, net population change, and regional bank deposit/national deposit ratio are all correlated with each other over than 87%. Hence, we just include first house sales as a representative for remaining six variables. Also, GVA per capita and net domestic migration variables are correlated with each other 84.4%. So, we just include GVA per capita to the model as a representative for net migration. Besides, we include real rent inflation rate variable which have considerable correlation rates with all other variables. Overall, we include three variables to the model as explanatory for house prices changes.

4.1. Stepwise Regression Model Results

Table 2. reports the analysis of variance (ANOVA). The p-value for the regression is significant at 5% level.

Table 2. Analysis of Variance

	DF	Adj. Sum of	Adj. Mean Square	F- Value	P- Value
Regression	1	0.0105	0.0105	5.69	0.025
Error	25	0.0464	0.0018		
Total	26	0.0570			

Table 3. reports the model summary. While adj. R square is 15.2%, the Durbin-Watson statistic is 2.031 which means there is no autocorrelation in residuals, so it can be said that the model is properly specified, though the R square is not very high.

Table 3. Model Summary

R	R Square	Adj. R Square	Std. Error of the Estimate	Durbin-Watson
0.431	0.185	0.152	0.0431	2.031

Table 4. reports the coefficients for the model. There is only one left statistically significant variable in the model except constant. GVA per capita is significant at 5% level. The coefficient indicates that \$10,000 increase in GVA per capita increase the house prices 0.7%. The regression equation after modeling is seen below.

$$\text{House Price Change (\%)} = 0.0526 + 0.000007 * \text{GVA per capita}$$

Table 4. Coefficients

Term	Coefficient	Std. Error of	t- value	p- value	VIF
Constant	0.0526	0.0253	2.08	0.048	
GVA per	0.000007	0.000003	2.39	0.025	1

4.2. Ordinary Least Squares Model Results

Table 5. reports OLS regression results in which it is understood that GVA per capita is the only statistically significant variable in the model. Its coefficient is similar as estimated in stepwise regression model. The coefficient indicates that \$10,000 increase in GVA per capita increase the house prices 0.74%. VIF values in Table 5., indicates that there is no multicollinearity problem in the model.

Table 5. OLS Regression Results

Term	Coefficient	Std. Error of	t- value	p- value	VIF
Constant	0.00340	0.04985	0.06	0.9462	
GVA per	7.43E-06	3.07E-06	2.41	0.0240	1.28
Real Rent	0.51204	0.42906	1.19	0.2449	1.22
First House	8.49E-08	8.41E-08	1.00	0.3232	1.05
R-square: 0.27 Adj. R-square:0.17 Durbin-Watson:2.16					

We exclude net domestic migration from model because it is highly correlated with GVA per capita. If we include net domestic migration to the model rather than GVA per capita, we reach that net migration is significant at 10% level. Net migration coefficient indicates that 100,000 migration inflow to a region increase the house prices 0.85%. The OLS results including net domestic migration are reported in Table 6. VIF values in Table 6., indicates that there is no multicollinearity problem in the model.

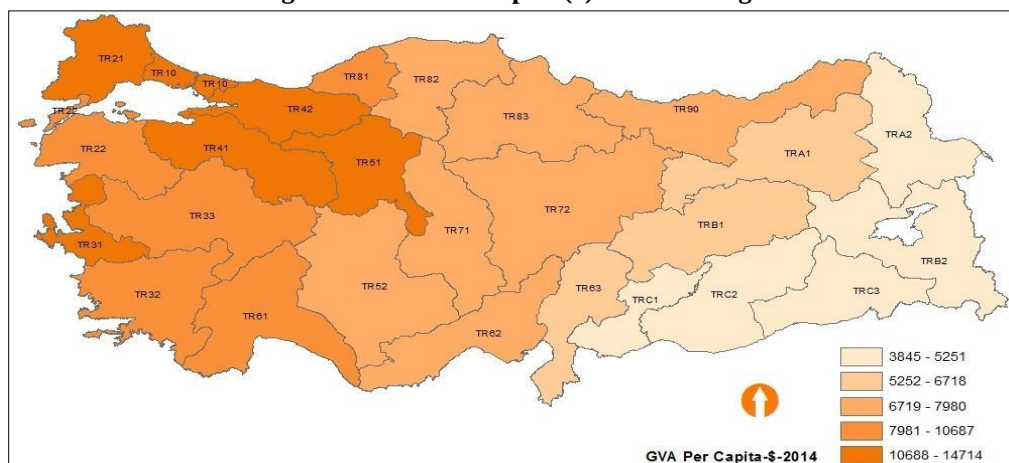
Table 6. OLS Regression Results included Net Domestic Migration

Term	Coefficient	Std. Error of	t- value	p- value	VIF
Constant	0.080239	0.032719	2.45	0.0222	
Net Domestis	8.58E-07	4.31E-07	1.98	0.0587	1.12
Real Rent	0.33336	0.42274	0.78	0.4384	1.10
First House	1.15E-07	8.50E-08	1.34	0.1909	1.01
R-square: 0.21 Adj. R-square:0.11 Durbin-Watson:2.22					

Both OLS results indicate that house prices changes are explained by GVA per capita and net domestic migration. This result is consistent with the findings of stepwise regression in which GVA per capita is found as a significant determinant.

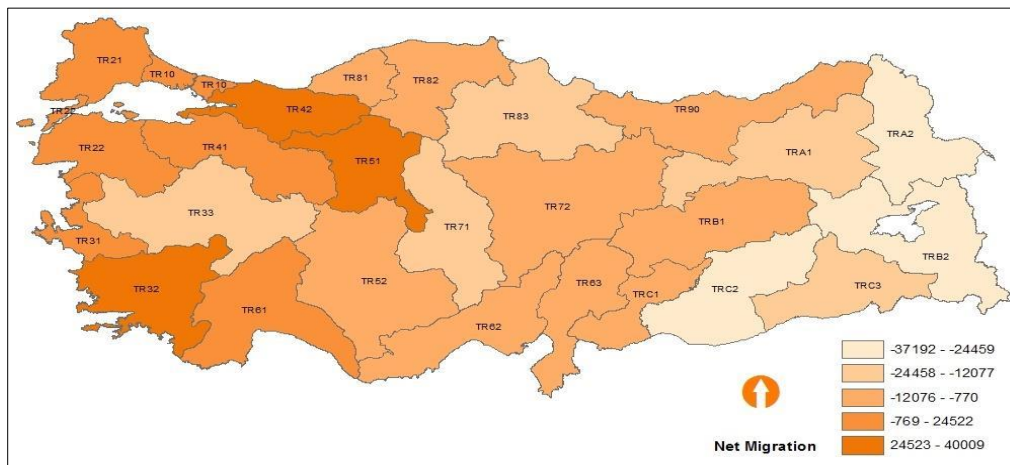
4.3. Comparative Analysis based on Regions

GVA per capita increases slightly from east part of the country to the west part (Figure 4.). This figure is actually very accurate representation of socio-economic levels and differences throughout the country. The regions which have higher GVA per capita are matching with the regions have higher industry GVA and amount of total house sales (see appendix for the related figure). As there are socio-political problems in most part of the east and southeast part of the country, there are lack of public and private investments, especially in industrial sector. On the other hand, Istanbul (TR10, as it shown on Figure 2.) and its hinterland attract people and business continuously since last 50 years.

Figure 4. GVA Per Capita (\$) based on Regions

Net domestic migration results also show disadvantageous position of eastern and southeastern part of the country (Figure 5.). Economic and socio-politic reasons are pushing people to move western provinces. There was a huge migration to Istanbul between 1950 and 1970. Nowadays, it slows down but still continues. TR42 and TR32 regions have provinces (e.g. Kocaeli, Denizli) with large industrial zones which means more employment opportunities for workers. Therefore, these regions are in highest level of net migration results. TR51 is Ankara (capital) as it stated in Figure 2. There is a rapid urbanization in Ankara since last decades. Residential and commercial constructions are rising on west part of the metropolitan area. Net domestic migration results show that this acceleration achieve population increase in the city by both attracting people and stopping residents to leave.

Figure 5. Net Domestic Migration based on Regions



5. Conclusion

Turkey experiences high inflation in house prices recent years. According to OECD, Turkey is in the second place for nominal house prices change and in the fourth place for real house price change within OECD countries for 2012:Q4-2013:Q4 period. In this study, we aim to examine the determinants of house prices in Turkey and its 26 development regions for 2014-2015 period by using OLS and stepwise regression models. We investigate the determinants of house prices in the perspective of macro factors. Hence, we used ten macro level explanatory variables to explain the annual house prices changes. These variables are real house rent inflation rate, agriculture sector gross value added, industrial sector gross value added, service sector gross value added, total first and second hand house sales, gross value added per capita, net domestic migration, net population change, and regional bank deposit/national deposit ratio. Regional distributions of each parameters of the study provide a general perspective on determinants of house prices. We face some restrictions in the study. Although construction cost is an important factor on house prices in Turkey, it is not included in the model because of lack of data. Besides, data of housing credit level is also not available in regional level. In addition, interest rate level is not considered as an explanatory variable in the study because it does not differ in regional level. Also, panel data model is not applied because the only available data belongs to 2014-2015 period. In this context, regression models results indicate that main drivers of house prices are GVA per capita and net migration. On the other hand, other variables are found that their effects on house prices are not statistically significant. These findings are crucial for individual and institutional investors and decision makers.

References

- Clark, S. P., Coggin, T. D. (2011). Was There a US House Price Bubble? An Econometric Analysis Using National and Regional Panel Data. *The Quarterly Review of Economics and Finance*, 51(2), 189-200.
- Du, H., Ma, Y., An, Y. (2011). The Impact of Land Policy on the Relation between Housing and Land Prices: Evidence from China. *The Quarterly Review of Economics and Finance*, 51(1), 19-27.
- Ebru, Ç., Eban, A. (2011). Determinants of House Prices in Istanbul: A Quantile Regression Approach. *Quality and Quantity*, 45(2), 305-317.
- Egert, B., Mihaljek, D. (2007, September). Determinants of House Prices in Central and Eastern Europe. *Monetary and Economic Department of Bank for International Settlements Working*

Paper, No:236.

- Galati, G., Teppa, F., & Alessie, R. (2011, March). Macro and Micro Drivers of House Price Dynamics: An Application to Dutch Data. *De Nederlandsche Bank Working Paper*, No.288.
- Himmelberg, C., Mayer, C., & Sinai, T. (2005). Assessing High House Prices: Bubbles, Fundamentals and Misperceptions. *Journal of Economic Perspectives*, 19(4), 67-92.
- Lastrapes, W. D. (2002). The Real Price of Housing and Money Supply Shocks: Time Series Evidence and Theoretical Simulations. *Journal of Housing Economics*, 11(1), 40-74.
- Li, Q., Chand, S. (2013). House Prices and Market Fundamentals in Urban China. *Habitat International*, 40, 148-153.
- Liu, W., Bao, Y., Xue, F. (2014). Empirical Analysis of the Interaction between Urbanization Level and Real Estate Price of Jiangxi Province, *Journal of Chemical and Pharmaceutical Research*, 6, 2006-2011.
- Mikhed, V., & Zemcik, P. (2009). Do House Prices Reflect Fundamentals? Aggregate and Panel Data Evidence. *Journal of Housing Economics*, 18(2), 140-149.
- Özsoy, O., Şahin, H. (2009). Housing Price Determinants in Istanbul, Turkey: An Application of the Classification and Regression Tree Model. *International Journal of Housing Markets and Analysis*, 2(2), 167-178.
- Panagiotidis, T., Printzis, P. (2015, January). On the Macroeconomic Determinants of the Housing Market in Greece: A VECM Approach. *Hellenic Observatory Papers on Greece and Southeast Europe, GreeSE Paper No.88*.
- Selim, H. (2009). Determinants of House Prices in Turkey: Hedonic Regression versus Artificial Neural Network. *Expert Systems with Applications*, 36(2), 2843-2852.
- Sole-Olle, A., Viladecans-Marsal, E. (2013). Do Political Parties Matter for Local Land Use Policies?, *Journal of Urban Economics*, 78, 42-56
- Stepanyan, V., Poghosyan, T., & Bibolov, A. (2010, April). House Price Determinants in Selected Countries of the Former Soviet Union. *International Monetary Fund Working Paper*, WP/10/104.
- Vanclay, F. (2002). Conceptualising Social Impacts, *Environmental Impact Assessment Review*, 22, 183-211
- Wang, Y. P. (2012). New Trend of Urbanization in China: Land and Housing Development in Suburban Areas and Small Towns, *Lincoln Institute of Land Policy Working Paper*, Code:WP13YW1
- Wen, H., & Goodman, A. C. (2013). Relationship between Urban Land Price and Housing Price: Evidence from 21 Provincial Capitals in China. *Habitat International*, 40, 9-17.

Appendix

