Determinants of housing prices in Baku: empirical analyses

Khatai Aliyev
UNEC Empirical Research Center,
Azerbaijan State University of Economics (UNEC), Baku, Azerbaijan, and

Mehin Amiraslanova, Nigar Bakirova and Narmin Eynizada
International School of Economics,
Azerbaijan State University of Economics (UNEC), Baku, Azerbaijan

Received 20 August 2018
Revised 11 October 2018
Accepted 17 October 2018

Abstract

Purpose – This paper aims to reveal major factors affecting housing prices (flats and houses) in Baku, the capital of Azerbaijan Republic.

Design/methodology/approach – Based on cross-sectional data set of 497 flats and 443 houses, polynomial regression models are estimated for flats and houses separately. Regression models are estimated by using ordinary least squares.

Findings – Location, largeness, repair level and existence of bill of sale are major price determinants for flats. For houses, number of rooms also matters. Findings reveals that houses are land intensive (more floors, less land area) toward city center, and vice versa. Price difference due to existence of bill of sale diminishes significantly toward the surrounding areas.

Research limitations/implications – The data set represents view of sellers and does not take into consideration price bargaining in time of sale; probability of information asymmetries exists which not could accounted for, and urgency of sale is not considered.

Practical implications – Estimation results can be used for housing valuation by real estate market participants and investors.

Social implications – Research findings reveal importance of bill of sale as a major price determinant and expected to attract policymakers' attention to solve such a big social problem. Additionally, models can be based for price estimations in Baku housing market.

Originality/value – The study contributes to the literature by empirically analyzing housing market in Baku, Azerbaijan. Research produces new practically valuable findings.

Keywords Location housing prices, Bill of sale, Flats, Houses, Physical characteristics

Paper type Research paper

1. Introduction

In many countries around the world, real estate is regarded as an asset that serves as the source of the passive capital for its proprietor. Therefore, real estate market is viewed as an integral part of the national economies. As a Filipino economist Habito (2009) stated "housing can be one of the most effective ways of stimulating consumption and production activity in other sectors of the economy". The great number of the studies demonstrates the importance and role of the housing in countries' economic prosperity and growth (Phang, 2001; Leung, 2004; Glossop, 2008) and one of the essential engines of such growth is investment in housing. According to worldwide practice, a number of factors emphasize low-risk context of housing investment – consequently, considerable amount of people views this option as a preferential one. Following this trend, investment in real estate is widely practiced by Baku residents as well. Hence, real estate prices have been consistently

International Journal of Housing Markets and Analysis

1753-8270
DOI 10.1108/IJHMA-08-2018-0062

a subject to discussions and concerns of all layers of population, from ordinary civilians to government officials and consequently, public policymakers, real estate owners, commission agents, as well as purchasers themselves are in great necessity for reliable sources to base their decisions on. Considering the shortage of an appropriate guidance, it is important to investigate this issue by using empirical estimation tools to provide scientific evidence.

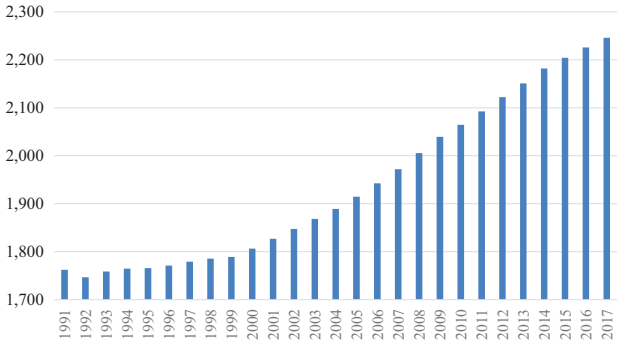
Being a capital as well as the largest and most dynamic city of Azerbaijan, Baku experiences constant growth in population. Based on statistics, in 1999, the number of people living in Baku accounted for 1 788 854 which increased by 20.9 per cent and reached 2,262,560 in the beginning of 2018 (see Figure 1).

These numbers exhibit the acceleration of urbanization process leading to accretion in demand and, subsequently, in supply in housing market of Baku. As law of supply and demand constitutes, the prices in housing market are determined by forces of supply and demand. In addition, besides the traditional theory of supply and demand, there are also other significant factors which define the prices in housing market. Generally, these factors separated into two approaches – macroeconomic approach and hedonic approach. The macroeconomic approach focuses on the fundamental macroeconomic indicators such as GDP, CPI, interest rates, unemployment rates and population growth and their impact on real estate market. Compared to macroeconomic analysis hedonic approach is narrower in scope but more detailed. Hedonic approach relates the price of the goods to their quality attributes. This approach was first formulated by Rosen (1974) and currently used in wide range of studies regarding housing market. The basis of this research is hedonic estimation. Research aims to define major determinants of housing prices in Baku by using empirical methods.

This paper is structured in a following way: Section 1 focuses on the review of the previously done studies. Section 2 concentrates on the hypothesis statement as well as analysis of additional literature. Section 3 describes the structure of the data as well as the methodology used in the research. Section 4 displays the empirical model and the outcomes of the econometric analysis. Finally, Section 5 interprets and summarizes the findings of the research.

2. Literature review

There are series of scientific studies regarding factors that affect the real estate prices and real estate markets in general. These factors are complicated and therefore classified into



Source: State Statistical Committee of the Republic of Azerbaijan, 2017

Figure 1.
Population dynamics in Baku (1991-2017)

separate areas of concern. The majority of the previous researches were mainly macroeconomic in scope with key emphasis on supply and demand, as well as, on various macroeconomic indicators, such as GDP, demographic factors, unemployment rate and interest rate (Leung, 2003; Yan *et al.*, 2011; Kang, 2011; Hui and Wang, 2014 among others). For instance, Quigley (1999) analyzed the relationship between economic "fundamentals" and the real estate prices. His studies determined that although economic fundamentals are important determinants of the housing prices and quite useful for forecasting the real estate price fluctuations, but these fundamentals are not enough for understanding the whole picture, especially in the short run.

The greater number of the studies emphasized the strong relationship between property prices and GDP, as well as demographic factors (Bujang *et al.*, 2010; Gao and He, 2014; Zandi *et al.*, 2015; Aizenman *et al.*, 2016; Reed, 2016; Xu, 2017). However, there is no consensus among various authors and analysts regarding this issue and outcomes are quite complicated. Sabal (2005) identified the increase in demand due to demographic growth accompanied by supply limitations as the main reason for increased property prices in the long run. Favorable economic conditions can be a push-up factor for rising housing prices; nevertheless, substantial indebtedness of many Spanish families may ultimately plummet the prices on local market. Posedel and Vizek (2009) use VAR model to examine housing price determinants in Croatia, Estonia, Poland, Ireland, Spain and the UK, and determine income and interest rate as the major influential factors. Later, Vizek (2010) also examined housing price determinants in selected Eastern and Western European countries. According to Vizek (2010), interest rates are considered as important long-run determinant of housing price, while construction activities play more significant role in the short run variations.

But on the other hand, Borowiecki (2009), by using the data set from the 1991 to 2007 on consumer price index, GDP, population size, interest rates and construction prices, analyzed the effect of these determinants on the Swiss housing market. The results of the analysis indicated that the real estate prices in Switzerland principally affected by construction prices and demographic variations, and only insignificantly influenced by real GDP, despite of the popular opinion on the role of this factor. Égert and Mihaljek (2007) examined housing prices trends in eight countries of Central and Eastern Europe by using traditional indicators, such as real income, real interest rates and demographic factors. As a result of this research, strong positive linkages were established between GDP per capita and house prices, real interest rates and house prices, between housing credit and house prices as well.

Cohen and Karpavičiūtė (2017) analyzed the data set from 2001 to 2014 and identified that approximately 99 per cent of the changes in the real estate prices in Lithuania are defined by determinants such as GDP, unemployment and introduction of macroprudential policy. Kok *et al.* (2018) investigated macroeconomic factors influencing property prices in Malaysia and concluded that 60 per cent of changes in real estate market are explained by real GDP. Tupenaite *et al.* (2017) using analytic hierarchy process method evaluated the most significant factors of property prices fluctuations in Lithuania over 2005-2015. As results reveal, the substantial fraction of variation in housing market is explained by fundamental economic indicators more specifically interest rates and inflation. The Ministry of Housing, Communities and Local Government (MHCLG) of UK (2018) executed an analysis designed to illuminate a relationship between several separate property market determinants and housing prices using data set for the period of 1991-2016. From the conclusions, it follows that over specified time interval holding all other things equal, there is positive relationship between population growth and housing prices, households' income and housing prices; however, there is negative relationship between housing supply and housing prices.

Using multiple regression analysis for the data set of 1994-2014 in case of Sydney housing market, Ge and Williams (2015) reveal that the limited housing supply on a par with population growth mainly caused by overseas migration are primary reasons of housing price growth in Sydney. Matongela (2015) studied Namibian property market by analyzing price determinants such as foreign direct investment, mortgage credit, land supply and interest rate. Findings of the research indicate that among all factors, only land supply has a significant effect on the real estate prices. Almutairi and El-Sakka (2016) analyzed housing affordability as well as main price determinants of real estate in Kuwait. Authors concluded that government's incompetence in housing provision is the reason of an acute housing affordability problem which in turn ignites property prices. Belke and Keil (2018) applied panel analysis for 127 German cities with large population size. The empirical results indicated that the unemployment rate, age structure of the population, income level as well as infrastructure are essential price determinants for German property market.

Gok and Keceli (2015) conducted a comparative analysis of the 26 Turkish development regions using essential macroeconomic indicators. In comparison with all included indicators only gross value added and net migration are detected as the most significant ones. Öztürk *et al.* (2018) have studied housing affordability and linkages between housing demand and macroeconomic variables in Ankara using time series analysis. According to results, in spite of the fact that housing supply increased significantly over the past three decades limited housing affordability still remains as an issue of concern. The research also highlighted the impact of the macroeconomic condition on housing demand. Another research regarding housing affordability conducted by Yap and Ng (2018) using qualitative research method exposed serious unaffordability problem in the form of discrepancy between property prices and households' real income in Malaysia.

There are also the wide range of studies considering the relationship between unemployment rate and real estate market. For instance, Gan and Zhang (2013) and Gan *et al.* (2018) using Texas city-level data analyzed the effect of change in unemployment on housing prices fluctuations and inferred that increase in the unemployment rate leads to lower housing prices and transaction values. Agnew and Lyons (2018) examined Irish property market and found out that there is positive relationship between job creation and housing prices. Gustafsson *et al.* (2016) using Bayesian VAR model performed a study which involves the quantitative evaluation of the possible effect of substantial housing price reduction on Swedish economy. Results suggest that such decline in housing prices would have considerable impact on unemployment and household consumption and this impact would be accelerated even further in the case if this price reduction is accompanied by global economic recession. Another area of interest in real estate market analysis is the impact of governmental policies and structural adjustments on housing prices behavior. Zhang and Wang (2016) studied the effect of China's governmental policy regarding the regulation of property market on housing prices. Findings indicated that limitations on the purchase of property have positive impact on dealing with speculative demand for houses. However, these restrictions are not powerful enough to reduce housing prices specifically in the cities with higher housing prices. Zhang and Wang (2018) also analyzed the impact of structural adjustment of industries in China on real estate prices and came to the conclusion that in general, there is a positive relationship between structural adjustment and housing prices, and this effect ranges across various cities. Hilber (2015) indicated UK's austere planning system as the primary reason of the "affordability crisis" in UK. Hilber and Schöni (2016) conducted a study similar to Hilber (2015) which covers three developed OECD members, namely, UK, Switzerland and USA, and highlights the housing affordability and

homeownership attainment concerns as well as countermeasures developed to address these problems.

In comparison with general factors, the number of the studies dedicated to internal determinants of housing prices, such as residential location, presence of environmental amenities and physical features of property, is limited Rodriguez and Sirmans (1994) studied the sale of the 192 houses in Virginia State. The findings showed that the houses that had nice views were sold at higher prices than houses with relatively bad views. Pollakowski (1982) stressed the importance of the environmental amenities as one of the determinants of housing prices. Simons *et al.* (1998) determined a strong positive linkage between the new construction and the prices. Ottensmann *et al.* (2008) using hedonic housing price model concluded that location is statistically significant factor influencing housing prices; however, it is not as important as housing features or neighborhood. Yan and Zhang (2006) by using HPM for city Hangzhou pointed the substantial role of the neighborhood characteristics in determining housing prices. Sirmans *et al.* (2006) by performing meta regression analysis determined how evaluated coefficients (area, rooms, age, garage and etc.) range by location and time. According to calculations most of these coefficients vary significantly by location. Islam (2012) has investigated the role of the neighborhood characteristics in real estate prices for the Canadian city, Edmonton. Findings indicate that the proximity to ravines, area of the house and the size of the lot have an important effect on real estate prices.

Zhang and Dong (2018) studied the role of the street greenery in house pricing using data set for Beijing. Findings suggest that there is a positive linkage between the presence of such amenity and value of houses.

One of the latest studies was made by the Airbnb company which function in an online market platform and provides hospitality services as well as participating in tourism related services and events. Gibbs *et al.* (2018) analyzed in total 15,716 Airbnb listings in five Canadian densely populated cities – Toronto, Ottawa, Montreal, Vancouver and Calgary – building hedonic pricing model to identify the effect of different variables on the amounts stated in Airbnb listings. The results of this research exhibited that traditional lodging properties such as location, number of rooms and etc. constitute essential factors that hosts consider when setting prices. In addition, hedonic pricing estimations showed that the existence of the amenities such as fitness center and swimming pool add value to the pricing, while the presence of parking places was not considered as important factor influencing the prices in most cities.

Frew and Wilson (2002) have used hedonic regression model to examine the relationship between rent values of the apartments and their locations in the city of Portland. Outcome of the research displayed that location is one of the essential factors affecting property prices. One of the few studies dedicated to the analysis of housing market of Azerbaijan was conducted by Adigozalov, Karimov and Aliyeva (2013) employing time-series analyses. The objective of the research was to evaluate the "bubble" prices by estimating the difference between equilibrium and actual price level in real estate market of Azerbaijan. Authors analyzed the real estate prices trend in Azerbaijan from 1993 to 2010 and came to conclusion that starting from 1993 – with privatization of property market – Azerbaijan's housing market began to operate actively. At early stages, the property prices tend to grow rapidly, as at this period, there were only few sellers in the market but demand was high. As population's income rose the demand in property market as well as the housing prices grew and reached its peak point in 2008. As a result of the investigation the "bubble" prices were estimated, the empirical model was developed to forecast the size of the "bubble" in coming year – for 2011 the size of the "bubble" prices composed 25 per cent in average. Before,

Stepanyan, Poghosyan and Bibilov (2010) have also estimated housing price determinants within time-series analyses framework for some Former Soviet Union countries, including Azerbaijan. Authors define GDP, remittances and external financing as the main explanatory factors of housing prices (Stepanyan *et al.*, 2010).

To our best knowledge, the only study similar to current research is Jafarov and Abbasov (2013). The have studied Azerbaijan's real estate market, most notably in Baku using hedonic price method. The results of the research displayed that the apartments' project, i.e. the way flat was planned is a significant factor affecting the value of the apartment. Thereby, the estimation showed that the apartments with "German", "Kiev", "Leningrad", "Stalin", "Khrushov" planning in average are more expensive than apartments with other planning. Not surprisingly, the apartments with excellent repair tend to cost higher than those without maintenance. The study also reveals inverse relationship between the distance from the center and price of the apartment: as the distance increase the prices decrease.

To sum up, empirical studies on housing prices in Azerbaijan is highly limited in number and amount of factors investigated, price determinants of houses and apartments are not studies comprehensively. Regarding the purpose of this research the central for our discussion is comparison among houses based on internal features of housing market rather than general macroeconomic determinants, taking into account the fact that there are almost no sufficient materials which considers the features and specificities of Azerbaijani market. Major novelty of the research is revealing characteristics of the relationship between housing prices and determining factors in Baku. To our best knowledge, no one examined non-linear associations and interaction effects. Therefore, current study will make significant contribution to the existing highly limited literature about real estate market in Baku, Azerbaijan.

3. Theoretical framework

As generally accepted, the range of housing constituents encompassing location, infrastructure, neighborhood as well as the presence of good environmental amenities are crucial elements determining the real estate value. A series of studies have demonstrated the positive relationship between location and the price of the property. Usually, the houses located in the city center are more expensive than those located in suburbs. Meese and Wallace (2003) analyzed the Parisian housing market and came to conclusion that there is a negative relationship between the remoteness from the center and the price of the house, i.e. the more the distance from center the less the price is. Another factor that has an impact on real estate valuation is transport infrastructure. This issue was closely examined by Henneberry (1998) for the case of the South Yorkshire in the UK and concluded that while the railway was in the process of construction the price of the houses located nearby this area has dropped. However, when the construction was over and railway began its operation the adverse effect on prices was eliminated. Presently, the proximity to main transportation hubs is of main importance as it gives the possibility to save time. Several researches were conducted regarding this issue; however, the outcomes are controversial: some studies concluded that there is a positive linkage between the proximity to metro stations and housing prices, others denied this proposal. While talking about Azerbaijani case, metro, definitely, regarded as the quickest means of transportation. With the respect to this statement, it is generally acknowledged that the price of the houses located in close proximity to metro is higher.

Another essential factor influencing the real estate pricing is neighborhood quality. Under term "neighborhood quality" is generally meant the presence of the amenities such as

parks, shopping centers, sporting facilities, grocery stores as well as proximity to the institutions such as schools, universities, hospitals and etc. Feng and Humphreys (2012) using cross-sectional data (1990-2000) for USA investigated the relationship between housing price and vicinity to sporting facilities. The results have shown that there is positive linkage between these two variables.

The year of the construction is also a fundamental factor affecting property price. According to previous studies, there is an inverse relationship between the age of the houses and their value with the exception of case when the building has some historical and architectural value. However, returning to Azerbaijani case, this issue is a little bit paradoxical. In general, in Azerbaijan the thoughts of people regarding the age of the houses vary among different categories of people. The older generation favor the old buildings referring to their reliability and durability meanwhile younger generation prefer the new buildings due to their compliance with new standards and requirements.

Another factor contributing to the price of the houses is the constructional attributes of houses such as the number of rooms, the total area of the house, the materials used in construction, the modern conveniences, layout plan and etc. Logically, as the area and number of rooms increase the price of the housing increase as well. In addition, when modern conveniences are available, willingness to pay of consumers increases. Considering the fact that we are analyzing the housing market as general, i.e. both houses and flats, it is important to note the distinctions between them. There are different variables specifically affecting the prices of flats and houses. For instance, the size of land area, the number of floors, existence of garage, pool as well as mansard significantly impacts the market value of the house. On the other hand, for flats, the important factors are floor on which it is located and existence of facilities such as elevators.

Finally, the presence of buying bill or bill of sale is very important attribute due to legal considerations. Azerbaijani sellers and buyers give a special attention to existence of legal documents confirming the legitimateness of purchase.

Certainly, the list of the factors affecting the housing prices does not end there. For instance, there are continuous debates among researchers whether the view from house influence the value of the property. Rodriguez and Sirmans (1994) using multiple regression analysis estimated the effect of "good views" on the price of the houses. The results of the research have revealed that there is a positive linkage between the view and value of the house.

3.1 Data description and methodology

Research methodology is based on Hedonic approach formulated by Rosen (1974). To reveal the most important determining factors of housing prices in Baku, cross-sectional database of 497 flats and 443 houses is formulated. To be practically more informative, it is decided to examine flats and houses separately. Logically, the most important factors affecting housing prices should be mentioned in selling advertisements. Therefore, the issue is investigated from seller point of view. Probably, there is a slight positive bias – selling price falls generally after bargaining negotiations among sides. However, this is also the best alternative. Thus, another alternative could be contract prices which is not publicly available, probably not exists for the houses without bill of sale and is negative bias as some amount is paid after hand over. In contrast, advertising prices and all other related information is easily accessible through real estate websites. Considering this assumption as the base, statistics are collected from three biggest real estate websites in Baku (www.emlak.az; www.bina.az; www.tap.az) during April, 2018.

Sampling is done randomly through all three websites. Variable selection rationale refers to the perception of sellers about the determining factor of housing prices. Methodology is that sellers report all possible information may affect prices. Possibility of information asymmetries is very low as all buyers check accuracy before decision making on purchasing. There are some limitations of this methodology: positive bias housing prices, not consider buyers' priorities, possibility of information asymmetries and degree of "urgency" for the seller. Especially, flats and houses are supplied for sale at significantly lower price than its real market value if the case is "highly urgent" and needs selling as soon as possible.

Most of the chosen variables are common for both flats and houses. However, because of the specific characteristics of each, there are also some different variables. Dependent variable "*PRC*" denotes the declared supplier price of each corresponding flat or house, measured in AZN. Natural logarithm of "PRC" is used for empirical estimations.

Independent variables are as follows:

- *LOC*: Proxy for the locations of houses and flats defined as the average price 1 m^2 within the corresponding area. The data refer to officially determined 12 zones in Baku area. Variable is included as natural logarithm.
- *RMN*: Number of rooms for each house or flat. Included as natural logarithm.
- *FLN*: Number of floors, for flats, it is number of floors of building, also the number of floors in the house.
- *AR*: Area of the house, measured in m^2, included as natural logarithm.
- *MODCON*: dummy variable, if modern conveniences are available equals 1, otherwise equals 0.
- *BOS*: bill of sale, dummy variable, if bill of sale is available equals 1, otherwise equals 0.
- *TYPE*: dummy variable, if real estate is new equals 1, otherwise equals 0 (only for apartments).
- *REP*: dummy variable, if real estate is repaired equals 1, otherwise equals 0.
- *FL*: floor on which the flat is located (for apartments).
- *GAS*: availability of gas, dummy variable, if gas is available equals 1, otherwise equals 0 (for apartments).
- *ENTRMNT*: proximity to social infrastructure, dummy variable, if flat is near to social infrastructures equals 1, otherwise equals 0 (for apartments).
- *PROXTOM*: Proximity to metro stations, dummy variable, if flat is near to metro stations equals 1, otherwise equals 0 (for apartments).
- *GAR*: dummy variable, if house has garage equals 1, otherwise equals 0 (only for houses).
- LAR: area of land, given in 100 m^2 (only for houses), included as natural logarithm.

And most of the chosen houses and flats are proper level of maintenance which is expected to affect prices positively. Randomly chosen sample shows that, for both houses and flats, only 51 per cent of houses and 65 per cent of flats have bill of sale. Note that bill of sale is perceived as the most important evidence of being legal of a housing item. That is why its positive impact over prices is expected to be very strong.

4. Empirical model

Our cross-sectional data for both parts of research is going to be analyzed by multiple regression models with the usage of Ordinary Least Squares (OLS) estimation method. Generally, the multiple regression models are shown like:

$$Y_i = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \ldots + \beta_5 * X_k + u_i \quad (1)$$

where k stand for kth independent variables. $\beta_{0\ldots k}$ are regression coefficients. Meanwhile, u_i is the error term.

After testing several model specifications by using Ramsey–Reset test, final version of models for empirical estimations are specified as follows:

For flats:

$$\begin{aligned} LOG(PRC)_i = {} & \alpha_0 + \alpha_1 * LOG(LOC)_i + \alpha_2 * RMN_i + \alpha_3 * LOG(AR)_i + \alpha_4 * LOG(AR)^2{}_i \\ & + \alpha_5 * FL_i + \alpha_6 + TYPE_i + \alpha_7 * ENTRMNT_i + \alpha_8 * MODCON_i \\ & + \alpha_9 * REP + \alpha_{10} + GAS_i + \alpha_{11} * BOS_i + \alpha_{12} * FLN_i \\ & + \alpha_{13} * PROXTOM + \varepsilon_i \end{aligned} \quad (2)$$

For houses:

$$\begin{aligned} LOG(PRC)_i = {} & \gamma_0 + \gamma_1 * RMN_i + \gamma_2 * FLN_i + \gamma_3 * LOG(AR)_i + \gamma_4 * LOG(LAR)_i \\ & + \gamma_5 * MODCON_i + \gamma_6 * REP_i + \gamma_7 * BOS_i + \gamma_8 * GAR_i \\ & + \gamma_9 * LOG(LAR)_i * LOG(LOC)_i + \gamma_{10} * FLN_i * LOG(LOC)_i \\ & + \gamma_{11} * LOG(LOC)_i * BOS_i + \omega_i \end{aligned} \quad (3)$$

Again, in flats' part, for variables such as ENTRMNT, MODCON, GAS, BOS and PROXTOM "*YES*" is defined by *1* and remaining option (i.e. NO) is left as the base group; for TYPE variable *NEW* is defined by *1* and otherwise that equals 0; for REP variable, *YES* is defined by *1*, otherwise *(NO and PARTIALLY)* is defined by *0*. Meanwhile, in houses' part, for variables such as MODCON, BOS and GAR "YES" is defined by *1* and remaining option for each variable is the base group which equals to 0; for REP variable *YES* is defined by *1*, otherwise *(NO and PARTIALLY)* is defined by *0*.

5. Interpretation of results

Estimated regression coefficients as well as standard errors for equation (2) and (3) are tabulated in Table II. Before interpreting the results, it is noteworthy to mention that randomness and representativeness principle is maintained while collecting data. Meanwhile, various model specifications are examined and tested against functional form misspecification issue. The results of Ramsey–Reset test for each corresponding equation is given at the end of Table II. For equations (2) and (3), p-values are 0.4924 and 0.6897, respectively. More precisely, in both cases, $p_value > 0.1$ or greater than 10 per cent. Therefore, null hypothesis of "no functional form misspecification problem" is not rejected. Estimated models do not have misspecification problem. Although, both model has heteroscedasticity problem (it is fairly weak in equation (2)), it has not impact over margins

Variables	No. observation	Mean	Maximum	Minimum	Std. deviation
Flats					
PRC	496	158020	1100000	29250	120130.3
LOC	497	2439.6	3283	1164	580.72
RMN	497	2.82	7	1	0.907
FLN	497	11.358	24	0	6.011
AR	497	101.21	540	26	50.20
MODCON	497	0.847	1	0	0.360
BOS	497	0.648	1	0	0.478
TYPE	497	0.595	1	0	0.491
REP	497	0.754	1	0	0.431
FL	497	6.708	20	0	4.893
GAS	497	0.726	1	0	0.446
ENTRMNT	497	0.559	1	0	0.497
PROXTOM	497	0.563	1	0	0.496
Houses					
PRC	443	267061.6	3500000	14500	444360.3
LOC	443	1929.8	3283	1164	587.87
RMN	443	4.706	14	1	2.114
FLN	443	1.781	7	1	0.889
AR	439	250.5	8000	7	452.25
MODCON	443	0.916	1	0	0.277
BOS	443	0.512	1	0	0.500
REP	443	0.892	1	0	0.311
GAR	443	0.126	1	0	0.333
LAR	443	7.718	300	0.25	22.878

Table I. Descriptive statistics of all variables

Source: Authors' own completion

of regression coefficients. Most coefficients are statistically significant and economically meaningful. On the other hand, Jargue–Bera test reveals that residuals are not normally distributed in both models. Because our sample size is considerable large, this does not substantially affects the efficiency of empirical results. Consequently, we can rely on estimation results and continue with interpretations.

Empirical results are highly interesting and practically useful, economically understandable. Thus, results show statistically and economically significant impact ($p_value < 0.01$) of "location" over the price of flats in Baku, while there is no direct impact of this variable on price of houses. In total, 1 per cent increase in average price of corresponding zone which the flat is within raises the price of flats by 0.37 per cent, while holding other things fixed, in average. Location influences the price of houses pass-through affecting the impact of the land area (LAR), number of floors (FLN) and existence of bill of sale (BOS).

For flats, results reveal that FL, TYPE, ENTRMNT, MODCON, GAS and FLN do not significantly affects prices. Therefore, these are not determining factors for price of flats in Baku. As expected, being repaired (REP) and having bill of sale (BOS) are determined as substantially important factors. If the flat is repaired, its price will be 19.5 per cent higher than un-repaired ones in average. Meanwhile, having bill of sale increases prices of a flat by 14.04 per cent compared to those have not bill of sale. Impact of both variable is statistically significant at 1 per cent level of significance ($p_value < 0.01$). One more important determining factor for prices of flats in Baku is proximity to metro stations. Research shows

For flats Equation (2)			For houses Equation (3)		
Variable	Coefficient	Std.error	Variable	Coefficient	Std.error
LOG(LOC)	0.361803***	0.050965	RMN	0.09898***	0.019741
RMN	−0.033501	0.025428	FLN	−2.379489***	0.625088
LOG(AR)	−1.267713**	0.458547	LOG(AR)	0.424184***	0.064626
$LOG(AR)^2$	0.274152***	0.050389	LOG(LAR)	3.583886***	0.803473
FL	−0.0000788	0.003724	MODCON	0.079558	0.105486
TYPE	−0.016990	0.042937	REP	0.553431***	0.093368
ENTRMNT	0.032015	0.026799	BOS	−3.653238***	1.494998
MODCON	0.018290	0.041359	GAR	0.156813*	0.087538
REP	0.194894***	0.031405	LOG(LAR) * LOG(LOC)	−0.452887***	0.106561
GAS	−0.034789	0.032575	FLN * LOG(LOC)	0.348054***	0.083256
BOS	0.140396***	0.031526	BOS * LOG(LOC)	0.547857***	0.198632
FLN	−0.002344	0.003565	C	7.622123***	0.287964
PROXTOM	0.107628***	0.025918	–	–	–
C	8.872309***	1.138636	–	–	–
R-squared	0.797		*R*-squared	0.727	
Sum squared resid	37.12		Sum squared resid	144.98	
N	496		N	439	
χ^2_{hetr}	1.5923 [0.0835]		χ^2_{hetr}	5.1895 [0.0000]	
JB_N	176.23 [0.0000]		JB_N	74.967 [0.0000]	
F_{FF}	0.4609 [0.4929]		F_{FF}	0.1596 [0.6897]	

Notes: Dependent variable is log(prc). χ^2_{hetr} denotes chi-squared statistics to test the null hypotheses of no heteroscedasticity in the residuals; JB_N indicate statistics to test the null hypotheses of normal distribution. F_{FF} represents the result of Ramsey–Reset test with the null hypothesis of "no functional form misspecification." Probabilities are in [. . .]. ***, ** and * denote statistical significance at 1, 5 and 10%, respectively

Table II.
Empirical results

that ceteris paripus, flats close to metro stations is approximately 11 per cent more expensive than others, in average.

According to results, the relationship between area of a flat and its price in not unidirectional. Estimations reveal existence of parabolic or U-shaped association. In other words, the elasticity of flats' prices to the area of corresponding flat is depend on the size. Note that coefficient of both log(AR) and $\log(AR)^2$ is statistically significant ($p_value < 0.05$). From the estimated model, it can be easily found threshold level of flat area:

$$\frac{\partial \log(prc)_i}{\partial \log(AR)_i} = -1.268 + 0.274 * 2 * \log(AR)_i = 0 \tag{4}$$

Solving equation (4) for$\log(AR)_i$:

$$\log(AR)_i = \frac{1.268}{0.548} = 2.314; \tag{5}$$

$$AR = \exp(2.314) = 10.11\, m^2 \tag{6}$$

Note that in the sample, the size of smallest flat is 26 m^2, largest is 540 m^2, and mean value for all is 90 m^2. In other words, there is no smaller flat than the threshold level. Therefore, real elasticity association starts long after the threshold level. Then, what the output from

equations (4) to 6 implies and the regression found existence of U-shaped association between these factors? The answer is that margin of elasticity coefficient as the size of a flat raises. To support this claim, it can be calculated elasticity coefficient at the size of the smallest and the largest flat in sample, as well as around mean value according to equation (4).

At the size of smallest flat:

$$\frac{\partial \log(prc)_i}{\partial \log(AR)_i} = -1.268 + 0.548 * \log(AR)_i = -1.268 + 0.548 * \log(26)$$
$$= -1.268 + 0.548 * 3.258 = 0.517 \quad (7)$$

Similarly, elasticity coefficient can be calculated at the size of largest flat and mean value. To conserve the space, calculations are not repeated. The coefficient at the size of largest flat is 2.18, and around mean value, it is 1.197. Therefore, increase size of a flat definitely raises the price level. However, responsiveness of price increases at the larger flats. Considering the finding that room number (RMN) does not significantly affect the price of a flat – even the coefficient is negative, it becomes clear that buyers prefer large flats with fewer rooms.

For houses, number of rooms is found as a highly influential factor. There is positive association between number of rooms and price of houses. The impact is statistically ($p_value < 0.01$) and economically significant. The semi-elasticity coefficient is 0.099. More precisely, while assuming all things being equal, 1 unit more rooms increases the price of a house by 9.9 per cent, in average. Size of the houses also significantly affects the price of real estate units ($p_value < 0.01$). According to estimation results, other things being equal, 1 per cent increase in the area of a house raises the price by approximately 0.42 per cent, in average.

One of the major physical characteristics of a house is the number of floors (FLN). However, research reveals that the impact of number of floors over price of hoses is significantly depend on the location. The coefficients of both "*FLN*" and the interaction term "$FLN * log(LOC)$" are statistically significant ($p_value < 0.01$) and economically substantial. Note that Mortgage and Credit Guarantee Fund of the Republic of Azerbaijan (MCGF, 2018) has separated Baku city into 12 zones and provided average price of 1 m^2 in each zone which is the data of "LOC" variable. In the city center, the price is the highest and that decreases toward the surrounding areas. Minimum price level is 1164 AZN/m^2 and maximum is 3283 AZN/m^2. Because, the coefficient of interaction term ($FLN*log(LOC)$) is positive, it can be concluded that marginal impact of FLN decreases toward the surrounding areas. To support this claim, note that semi-elasticity coefficient is 0.077 ($-2.379 + 0.348 * \log(1164)$) at the cheapest (1164 AZN/m^2) zone and 0.44 ($-2.379 + 0.348 * \log(3283)$) within the most expensive (3283 AZN/m^2) zone.

For houses, one more the most influential factor is the size of land area. The impact of land area size over house prices is statistically significant (*p_value*); however, the magnitude of impact is also significantly depends on the location, included as the interaction term - "$\log(LAR)*log(LOC)$" (*p_value*). Coefficient of the interaction term is negative, implying that responsiveness of prices to the size of land area increases toward the surrounding zones and vice versa. Again, it is possible to calculate the magnitude of the elasticity coefficients for the cheapest and the most expensive zones. For the cheapest zone (1164 AZN/m^2), elasticity coefficient is 0.386 (3.584 − 0.453*log(1164)), while it is negative 0.084 for the most expensive zone (3.584 − 0.453*log(3283)). For houses, one more influential factor is

having its own garage which increases the price by 15.6 per cent, in average. In addition, repaired houses are 55.3 per cent more expensive than unrepaired ones. This impact is economically as well as statistically significant ($p\_value < 0.01$).

When the responsiveness to the number of floors and size of land area is taken into consideration at the same time, one important generalization can be made. In the city center, house prices are "floor dominated" while toward the surrounding areas, price is "land area dominated". This is plausible. In the city center, land area is highly limited, price is very high, and consequently consumers tend to minimize land area in favor of house area. However, toward the surrounding areas, consumers prefer to have their own garden.

Maybe the biggest problem of real estate market in Baku is related to have document of ownership or not. This is especially crucial for houses. In this context, bill of sale (BOS) is the document which the buyers can rely on. According to CESD (2015), number of such houses was more than 500 thousand, mostly build around surrounding area of the city. The problem still remains its priority. That is why its substantial impact over price of houses is expected. Empirical results confirm this expectation. The impact is statistically and economically significant ($p_value < 0.01$). However, it is revealed that the impact of having BOS or not is also depend on the location – coefficient of interaction term is statistically significant ($p_value < 0.01$). Toward the city center where the value of LOC it the highest, BOS affect the price of houses the most. For the cheapest region (1164 AZN/m^2), the semi-elasticity coefficient is 0.215 ($-3.653 + 0.548*\log(1164)$) while in the most expensive zone, the coefficient is 0.784 ($-3.653 + 0.548*\log(3283)$). More precisely, in the cheapest zone, the price of a house with bill of sale is 19.4 per cent higher than the one has no bill of sale. This difference is 79.4 per cent in the most expensive zone. Table III presents more information about difference in the magnitude of impact due to location across 12 zones.

6. Conclusion and discussion

Housing market may be perceived as a field of investments as well as exchange of products those are highly valuable for life satisfaction of citizens. Investigation of which factors mostly pushes up or down housing prices should be at the center of interest of all real estate market participants – ordinary buyers or sellers as well as investors. This research investigates major determining factors affecting the housing price dynamics in real estate

Zones	Average market price (AZN/ m^2)	The impact of additional no. of floors (%)	The impact of 1% increase in land area (%)	The impact of having bill of sale (BOS) (%)
1	3283	43.85	−8.37	78.39
3	3158	42.51	−6.61	76.26
2	3012	40.86	−4.47	73.67
6	2618	35.98	1.88	65.98
4	2420	33.24	5.44	61.67
7	2201	29.94	9.74	56.48
5	2067	27.76	12.58	53.03
8	1791	22.77	19.08	45.18
9	1658	20.08	22.57	40.95
10	1494	16.46	27.29	35.24
11	1207	9.03	36.96	23.55
12	1164	7.77	38.60	21.57

Note: Authors' own calculations

Table III. Variations in the magnitude of impact due to location over house prices

market of Azerbaijan's capital and the biggest city, Baku according to released data by suppliers through advertisement websites. Before, Adigozalov *et al.* (2013) and Jafarov and Abbasov (2013) attempt to explain housing price dynamics empirically for Baku, Azerbaijan. More close to our research is Jafarov and Abbasov (2013) using hedonic price method of which the results are highly limited and covers only flats.

Therefore, this research fills a huge gap in the real estate literature for the case of Baku, Azerbaijan. Estimating major factors affecting housing prices by employing sufficiently large cross-sectional data, separately for houses and flats, is a significant contribution.

Research reveals that location and area of flats strongly affects supplier price of the estate while room number does not significantly matter, similar to the findings of Jafarov and Abbasov (2013). Meanwhile, floor of the flat, proximity to social infrastructure, availability of modern conveniences or gas does not substantially affect prices. Price of flats is also not affected by number of floors in an apartment. However, location near to metro stations strongly affects flat prices in Baku, makes 10.8 per cent more expensive than others with the same characteristics, in average. Another biggest influential factor is being well maintained. Repaid flats are approximately 19.5 per cent more expensive than unrepaired ones while assuming to share similar features, in average. Other important factor is existence of bill of sale which increases price by nearly 14.04 per cent, *ceteris paribus*. To sum up, findings display that location, largeness, repair, existence of bill of sale and proximity to metro stations are main determining factors for flat prices in Baku. Overall, model explains 79.7 per cent of variations in flat prices.

Research findings produce highly interesting and practically valuable results for house prices in Baku. It is identified that price of houses are highly elastic to number of rooms, largeness of the living area, level of repair as well as having separate garage. 1more room and 1 per cent increase in largeness of the house raises price by approximately 9.89 and 0.42 per cent, *ceteris paribus*. On the other hand, repaired houses are substantially more expensive (nearly 55.3 per cent, *ceteris paribus*) than others.

Probably, the biggest novelty of the research is identifying interaction effects. Thus, it is found out that the impact of number of floors, size of land area and having bill of sale over house price is significantly depend on location of the house or proximity to the city center. Toward city center in which direction price of land increases, buyers prefer houses with more floors and less land area and vice versa. Existence of bill of sale increases its role in determining prices toward the city center. In surrounding districts, the price difference due to existence of bill of sale falls substantially. Overall, these factors explain 72.7 per cent of variations in house prices.

Major limitation of this study is to be based on supplier prices declared over real estate selling websites. However, observations show that housing prices also falls due to bargaining, before the agreement on sale. Additionally, the impact of "urgency of sales" factor is not controlled in the empirical estimations. The second one is about data availability and trustfulness of declared information.

Limitations of current study open perspectives for future studies. Advertising mostly include "urgency of sale." This notion really significantly affects housing prices or is used just to manipulate consumers' decisions. In the current literature, there is no any research from consumer side. More precisely, a new research (probably experimental) about how certain indicators affect housing valuation by consumers can be carried out. Finally, the impact of bargaining in time of sales can be subject to a future study.

References

Adigozalov, S., Karimov, X. and Aliyeva, H. (2013), "Daşınmaz əmlak bazarında qiymət səviyyəsinin qiymətləndirilməsi", *The Central Bank and Economy Magazine*, Vol. 1, pp. 109-116.

Aizenman, J., Jinjarak, Y. and Zheng, H. (2016), "House valuations and economic growth: some international evidence", *National Bureau of Economic Research*. No. w22699.

Agnew, K. and Lyons, R.C. (2018), "The impact of employment on housing prices: detailed evidence from FDI in Ireland", *Regional Science and Urban Economics*, Vol. 70, pp. 174-189.

Almutairi, H. and El-Sakka, M.I.T. (2016), "Determinants of housing prices in an oil based economy", *Asian Economic and Financial Review*, Vol. 6 No. 5, pp. 247-260.

Belke, A. and Keil, J. (2018), "Fundamental determinants of real estate prices: a panel study of german regions", *International Advances in Economic Research*, Vol. 24 No. 1, pp. 25-45.

Borowiecki, K.J. (2009), "The determinants of house prices and construction: an empirical investigation of the swiss housing economy", *International Real Estate Review*, Vol. 12 No. 3, pp. 193-220.

Bujang, A.A., Zarin, H.A. and Jumadi, N. (2010), "The relationship between demographic factors and housing affordability", *Malaysian Journal of Real Estate*, Vol. 5 No. 1, pp. 49-58.

CESD (2015), "Prezidentin sərəncamina aid olmayan evlərin taleyi necə olacaq?" Available at: http://cesd.az/new/?p=8988&lang=az,20.08.2018

Cohen, V. and Karpavičiūtė, L. (2017), "The analysis of the determinants of housing prices", *Independent Journal of Management and Production*, Vol. 8 No. 1, pp. 049-063.

Égert, B. and Mihaljek, D. (2007), "Determinants of house prices in Central and Eastern Europe", *Comparative Economic Studies*, Vol. 49 No. 3, pp. 367-388.

Feng, X. and Humphreys, B.R. (2012), "The impact of professional sports facilities on housing values: evidence from census block group data", *City, Culture and Society*, Vol. 3 No. 3, pp. 189-200.

Frew, J. and Wilson, B. (2002), "Connection between location and property values", *Journal of Real Estate Practice and Education*, Vol. 5 No. *1*, pp. 17-25.

Gao, B. and He, X. (2014), "The influence of demographic structure on housing price: an empirical analysis of Chongqing", *Modern Economy*, Vol. 5 No. 5, pp. 609.

Ge, X. and Williams, B. (2015), "House price determinants in sydney", *In European Real Estate Society 22nd Annual Conference. Urban and Environmental Planning and Research Center, Istanbul Technical University*.

Gibbs, C., Guttentag, D., Gretzel, U., Morton, J. and Goodwill, A. (2018), "Pricing in the sharing economy: a hedonic pricing model applied to airbnb listings", *Journal of Travel and Tourism Marketing*, Vol. 35 No. 1, pp. 46-56.

Gok, I.Y. and Keceli, A. (2015), "Determinants of house prices in Turkey: comparative analysis of development regions", *In The 2015 WEI International Academic Conference Proceedings*, pp. 110-122.

Gustafsson, P., Stockhammar, P. and Österholm, P. (2016), "Macroeconomic effects of a decline in housing prices in Sweden", *Journal of Policy Modeling*, Vol. 38 No. 2, pp. 242-255.

Gan, L., Wang, P. and Zhang, Q. (2018), "Market thickness and the impact of unemployment on housing market outcomes", *Journal of Monetary Economics*.

Gan, L. and Zhang, Q. (2013), "Market thickness and the impact of unemployment on housing market outcomes", *National Bureau of Economic Research*, No. w19564.

Glossop, C. (2008), *Housing and Economic Development: Moving Forward Together*, Housing Corporation.

Habito, C. (2009), "Housing as economic stimulus", *Philippine Daily Inquirer*, September 6.

Henneberry, J. (1998), "Transport investment and house prices", *Journal of Property Valuation and Investment*, Vol. 16 No. 2, pp. 144-158.

Hui, E.C. and Wang, Z. (2014), "Price anomalies and effectiveness of macro control policies: evidence from chinese housing markets", *Land Use Policy*, Vol. 39, pp. 96-109.

Hilber, C.A. (2015), "UK housing and planning policies: the evidence from economic research", *CEP Election Analysis, Paper EA033*, pp. 1-14.

Hilber, C.A. and Schöni, O. (2016), "Housing policies in the United Kingdom, Switzerland, and the United States: lessons learned", *Cityscape*, Vol. 18 No. 3, pp. 291-332.

Islam, S. (2012), "Impact of neighbourhood characteristics on house prices", *ASBBS Proceedings*, Vol. 19 No. 1, pp. 443-451.

Jafarov, E. and Abbasov, C. (2013), "Daşınmaz əmlak bazarında qiymət indeksləri", *The Central Bank and Economy Magazine*, Vol. 1, pp. 36-44.

Kok, S.H., Ismail, N.W. and Lee, C. (2018), "The sources of house price changes in Malaysia", *International Journal of Housing Markets and Analysis*, Vol. 11 No. 2, pp. 335-355.

Kang, W. (2011), "Housing price dynamics and convergence in high-tech metropolitan economies", *The Quarterly Review of Economics and Finance*, Vol. 51 No. 3, pp. 283-291.

Leung, C.K.Y. (2003), "Economic growth and increasing house prices", *Pacific Economic Review*, Vol. 8 No. 2, pp. 183-190.

Leung, C. (2004), "Macroeconomics and housing: a review of the literature", *Journal of Housing Economics*, Vol. 13 No. 4, pp. 249-267.

Matongela, A.M. (2015), "A quantitative investigation into determinants of house prices in Namibia", *Journal of Economics and Sustainable Development*, Vol. 6 No. 4, pp. 1-6.

MCGF (2018), "Orta bazar qiyməti (01.04.2017 - 16.10.2017 dövrü üçün)", available at: http://mcgf.az/?/az/menu/125/ (accessed on 27 July 2018).

Meese, R. and Wallace, N. (2003), "House price dynamics and market fundamentals: the parisian housing market", *Urban Studies*, Vol. 40 Nos 5/6, pp. 1027-1045.

Ministry of Housing, Communities and Local Government (MHCLG) (2018), "Analysis of the determinants of house price changes", Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/699846/OFF_SEN_Ad_Hoc_SFR_House_prices_v_PDF.pdf (accessed on 25 July 2018).

Ottensmann, J.R., Payton, S. and Man, J. (2008), "Urban location and housing prices within a hedonic model", *Journal of Regional Analysis and Policy*, Vol. 38 No. 1, pp. 19-35.

Öztürk, A., Kapusuz, Y.E. and Tanrıvermiş, H. (2018), "The dynamics of housing affordability and housing demand analysis in Ankara", *International Journal of Housing Markets and Analysis*.

Pollakowski, H.O. (1982), *Urban Housing Markets and Residential Location*, Free Press, Vol. 43.

Posedel, P. and Vizek, M. (2009), "House price determinants in transition and EU-15 countries", *Post-Communist Economies*, Vol. 21 No. 3, pp. 327-343.

Phang, S.Y. (2001), "Housing policy, wealth formation and the Singapore economy", *Housing Studies*, Vol. 16 No. 4, pp. 443-459.

Quigley, J.M. (1999), "Real estate prices and economic cycles", *International Real Estate Review*, Vol. 2 No. *1*, pp. 1-20.

Rosen, S. (1974), "Hedonic prices and implicit markets: product differentiation in pure competition", *Journal of Political Economy*, Vol. 82 No. 1, pp. 34-55.

Reed, R. (2016), "The relationship between house prices and demographic variables: an australian case study", *International Journal of Housing Markets and Analysis*, Vol. 9 No. 4, pp. 520-537.

Rodriguez, M. and Sirmans, C.F. (1994), "Quantifying the value of a view in single-family housing markets", *Appraisal Journal*, Vol. 62, pp. 600-600.

Sabal, J. (2005), *The Determinants of Housing Prices: the Case of Spain*, ESADE.

Sirmans, G.S., MacDonald, L., Macpherson, D.A. and Zietz, E.N. (2006), "The value of housing characteristics: a meta analysis", *The Journal of Real Estate Finance and Economics*, Vol. 33 No. 3, pp. 215-240.

Simons, R., Quercia, R. and Levin, I. (1998), "The value impact of new residential construction and neighborhood disinvestment on residential sales price", *Journal of Real Estate Research*, Vol. 15 No. 2, pp. 147-161.

State Statistical Committee of the Republic of Azerbaijan (2017), *Demographic Indicators of Azerbaijan*, Statistical Yearbook, Baku.

Stepanyan, V., Poghosyan, T. and Bibolov, A. (2010), "House price determinants in selected countries of the former soviet union", Imf Working Papers, Vol. 10 No. 104.

Tupenaite, L., Kanapeckiene, L. and Naimaviciene, J. (2017), "Determinants of housing market fluctuations: Case study of Lithuania", *Procedia Engineering*, Vol. 172, pp. 1169-1175.

Vizek, M. (2010), "Short-run and long-run determinants of house prices in Eastern and Western european countries", *Privredna Kretanja i Ekonomska Politika*, Vol. 125 No. 2010, pp. 27-60.

Xu, T. (2017), "The relationship between interest rates, Income, GDP growth and house prices", *Research in Economics and Management*, Vol. 2 No. 1, pp. 30-37.

Yap, J.B.H. and Ng, X.H. (2018), "Housing affordability in Malaysia: perception, price range, influencing factors and policies", *International Journal of Housing Markets and Analysis*, Vol. 11 No. 3, pp. 476-497.

Yan, Y., Yan-Ting, W. and Xiao-Wu, Z. (2011), "Heterogeneous responses of chinese cities' housing prices to monetary policies", *Communications in Theoretical Physics*, Vol. 56 No. 4, pp. 791-796.

Yan, D. and Zhang, W.W. (2006), "Neighborhood characteristic and housing price: An empirical analysis based on hedonic price model", The CRIOCM 2006 International Symposium on "Advancement of Construction Management and Real Estate", Retrieved from www.irbnet.de/daten/iconda/CIB5720.pdf, (accessed on 25 July 2018).

Zhang, H. and Wang, X. (2016), "Effectiveness of macro-regulation policies on housing prices: a spatial quantile regression approach", *Housing, Theory and Society*, Vol. 33 No. 1, pp. 23-40.

Zhang, H. and Wang, X. (2018), "The impact of structural adjustment on housing prices in China", *Asian-Pacific Economic Literature*, Vol. 32 No. 1, pp. 108-119.

Zhang, Y. and Dong, R. (2018), "Impacts of Street-Visible greenery on housing prices: evidence from a hedonic price model and a massive street view image dataset in beijing", *ISPRS International Journal of Geo-Information*, Vol. 7 No. 3, pp. 104-123.

Zandi, G., M., A., Supramaniam, L., Aslam, A. and Theng, L.K. (2015), "The economical factors affecting residential property price: the case of Penang island", *International Journal of Economics and Finance*, Vol. 7 No. 12, pp. 200-210.

Corresponding author
Khatai Aliyev can be contacted at: khatai.aliyev@unec.edu.az