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Oil Price Shocks and Housing Business Cycles in Iran: Markov Regime-Switching GARCH Model

Seyed Parviz Jalili Kamjo*
Assistant Professor, Department of Economics, Ayatollah Boroujerdi University, Boroujerd, Iran
Younes Nademi
Assistant Professor, Department of Economics, Ayatollah Borujerdi University, Boroujerd, Iran

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Abstract: The housing market is one of the most important subsectors of capital markets that have the most backward and forward linkages with other sectors. Because of the high dependence of Iranian economy to oil revenues, oil price shocks can be affect the housing market. The aim of this study is to analyze the business cycle of the housing market, with emphasis on the impact of oil shocks on the return of housing. According to APM model, regardless of portfolio selected, several factors affect the return of housing assets that in this study, the risk and shocks of macroeconomic factors including money supply, private sector investment, housing facilities allocated by special Maskan Bank and oil export revenues, have been analyzed on the housing return by a Markov regime-switching GARCH model during the period 1982 -2016. The results have shown that the return of housing in the Iranian economy has three high, moderate and low return regimes. So that the volatility of the housing return is different in each of the three regimes. Housing returns volatility at the low return regime is more than volatility of returns at the moderate and high return regimes. Therewith in the 35 years of the research period, housing market has been 13 years in the moderate return regime, 20 years in the low return regime and only 2 years in the high return regime. The results also showed that based on Dutch disease hypothesis oil shocks, liquidity and private investment have a significant positive impact on the return of housing but the housing facilities of Maskan Bank have a significant negative impact on the return of housing.

Keywords: Oil Price Shocks, Business Cycles, Markov Switching GARCH Approach, Iranian Housing Market
JEL Classification: L71, R31, C22, F17

* Corresponding author: Parviz.jalili@abru.ac.ir

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1- Introduction

Based on the Dutch disease hypothesis one of the housing market's characteristics in oil exporting countries is the impact of oil incomes on the housing sector (Yigi, 2017). Iran's economy is also under the influence of oil resources rents, and oil affects Iran's economy from different channels. So that based on the Dutch disease hypothesis, the exchangeable and non-exchangeable goods are influences by the cycles of oils (Egert, & Carol. 2008; Demary, 2010). The housing market as a non-exchangeable capital good provider can be directly affected by the oil incomes in the side of supplies and demands (Gareis & Mayer, 2013). The housing sector allocated 3.18 and 2.8 percent of GDP to itself on 2016 and 2017and it has been considered as an asset that has kept the value of the private sector investments (economic indicators of Iran's Central Bank, 2017). The share of private sector compare to the state share toward the fixed gross capital formation is approximately about 76 percent, while the private sector's share from the fixed gross capital formation is about 47 percent (national accounts, 2017), which indicates the particular attention of the private sector to this asset or capital. The variables that affect the business cycle of housing are divided into two different categories of micro and macroeconomics (Grace & Mir, 2013). At the macro level, the housing market with frequent price bubbles has been a good haven for the liquidity of 1,200(the credit balance of the deposit bank accounts) billion Tomans (Economic indicators of the Central Bank, 2017). Assessing the recent decades of Iran's economics information indicates that the oil price and liquidity are highly correlated and can be generalized to the relationship between the liquidity and housing prices (Aram et al, 2011). The results of some studies show that; the construction sector absorbs 25% of country's liquidity (Abasinezhad & Yari, 2010). There is also a relationship between the GDP business cycle and housing business cycle in most of the world's countries (Funke, & Paetz, 2013). At the microeconomic level, the share of housing at the expenses of an urban household has reached form 6.27% in 2005 to 35% in 2016, and this rate is more severe in lower deciles. The shortage of apartments have also reached form 27 in 1979 to 4 in 2016, while the number of households have grew by 260 percent (3.6 times). Thus the household per capita rate of apartment shortage has decreased about 1.87 times in last four decades. The rental rate among the Iranian households were about 22.9, 26.6 and 30.7 percent in 2006, 2011 and 2017 and 67.9, 62.7 and 60.5 percent of the Iranians were the landlords, which shows that housing is a capital item among the households (Iran's Statistics Center, 2017). Of course, housing is a very fundamental need in determining the livelihood portfolio in estimating the poverty line (Khabazzadeh et al., 2014) and it is also a luxurious need (Iacoviello, 2004, 2010). Thus housing demand which is known as a capital good is a function of capital return rate in housing sector compare to the return rate of other different investments (Nasrollahi and Gholami, 2014). In some developed economies like Ireland, the housing sector has the most contact with money market, as giving the bank guaranties to housing sector in long and short terms is highly correlated (Grace & Mir, 2013). However, there is a one-way relationship between banking facilities and housing prices in

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Iran (Gholizadeh & Bakhtiari, 2012). Iran's economy has two important characteristics: the massive share of oil in Iran's economy and country's significant presence in various sectors of the economy. This research seeks to assess the impact of these two important features on housing sector. Based on the arbitrage-pricing model, regardless of the nature of the stock portfolio, several exogenous factors are effective on the return of housing properties. The purpose of this study is to assess the risks and shocks in macroeconomics such as the money volume, private sectors investments, special banking facilities in housing sector, and oil exchange incomes on return of capital in housing sector, by the Markov-Switching GARCH 3D Model between 1981 and 2016. The main hypothesis of this research is that the return of housing market is affected by the shocks of oil incomes. In addition, the main questions of this study are:

Do oil revenues have led to an increase in housing sector? Or in other words; is housing, as an intangible commodity has been affected by the Dutch disease? Is return on the housing sector is just nominal and liquidity growth have led to an increase in the efficiency of housing market? Is the rise of private sector's presence in housing sector have led to an increase in the efficiency of housing market, based on the theories of classic and Laissez-faire economics? In addition, the rise of private sector's presence in housing sector will lead to a more efficient housing market? Alternatively, could the government sector put a positive effect on the housing sector by its facilities and tools?

2- Literature Review

a) Foreign Researches

Yiki (2017) have used an empirical model to assess the impact of oil on housing prices in different parts of Norway. The results showed that in the areas in which the oil revenues are invested, the impact of oil revenues on housing prices is more than other areas, even at the national level.

Mawali et al., (2016) have evaluated the impact of oil sector on the efficiency of housing sector with a microeconomics model in Oman. The results showed that the oil sector's shocks have the most effect on housing and agriculture sector's shocks.

Funke & Paetz (2013) have evaluated the relationship between the business cycles of GDP and housing in Hong-Kong. The results showed that the housing price fluctuations can led to GDP fluctuations.

Katrakilidis & Trachanas (2012) used macroeconomic variables in order to determine the effective factors on housing prices in Greece. The results showed that the positive and negative changes of macroeconomics have a significant impact on long-term and short-term housing prices.

Beltratti & Morana (2010) showed that the global shocks are in the supply side of the economy while the housing price fluctuations in the countries that are the member of Group-7, and there is a relationship between the real housing prices and the macroeconomics factors.

Saiz (2010) has evaluated the geographical variables on housing efficiency in US. The results showed that the variables of land, population, geographical location of the house and its distance from town and province have a direct influence on housing prices.

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Dimary's research (2010) showed that, at the international level, the interest rate of the money market has a negative effect on housing prices and GDP; and the inflation has positive impact on housing prices.

Suersen (2006) analyzed the causes of global growth, global movements, and the short-term movements in housing prices, by the use of Tobin's Q and ARDL model in four countries of America, England, Norway and Netherlands. The results showed that the population is an effective variable in housing prices and banking facilities has a little impact on the decrease of housing prices, and income does not have an impact on Iran's housing prices.

b) Iranian Researches

Abolhasani et al. (2017) showed that the oil incomes can led to the inflation increase in economy by an increase in liquidity and demands of private sector, and an oil shock can led to a temporary increase in production and inflation in housing and non-housing sectors. With this difference, the inflationary impact of this shock will be more than the production. In sum, the results of the instantaneous response functions and the comparison of the moment of the model with the actual data indicate that the proposed model can greatly explain the cyclical fluctuations of the macroeconomic variables of the housing and non-communicative sector.

Nasrollahi & Gholami (2013) have concluded that the affecting variables on housing price in metropolitan areas of Iran are housing loans, housing rent, gross regional production, exchange rate, inflation rate, and interest rate of banking facilities. The coefficients of all variables are statistically significant.

Monjaeb & Mostafapour (2014) have studied the effects of the Maskane Mehr housing project on the housing market in Iran were analyzed using panel data and using the asymmetric ARDL model proposed. For this purpose, data from 9 provinces in the period 1991 to 2011 have been used. Variables have been extracted from the Patterns of Tuberba and Tobin, and the intended variable is used to study the effect of seals on housing prices, the number of construction licenses issued. The results indicate the high impact of the variable of households (population) and liquidity on housing prices. The results showed that the Mehr housing plan has not been able to reduce the housing price trend, and only the implementation of this plan, through impact on future expectations of the people, has caused a slump in the housing sector, which has led to a relative decline in housing prices.

Abarghoei & Nafisi (2012) have evaluated the relationship of housing prices and GDP in Iran's metropolitans (11 provinces) by the use of panel model. The results showed that the economic growth and inflation had a positive effect on the housing prices.

Gholizadeh & Bakhriyari (2012) used the model of Greef & House (2000) to show that there is a significant and positive relation between the banking facilities for the housing sector and the housing prices in both short-term and long-term, and there is a causal one-way relation from banking facilities to the housing prices.

Gholizadeh & Akbariyan (2011) used an ARDL model in the period of 1992-2006, to show that there is a significant and positive relationship between the economic growth and housing and non-housing investments in Iran.

Abbasinezhad & Yari (2009) used an ARDL model in the period of 1973-

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2005 to show that the population growth variables, liquidity growth rate, facilities growth rate, positive and negative shocks of the oil revenues have a significant and positive effect on housing prices and it is agreed with the theory and the effect of increase in inflation's rate is not significant.

Gholizadeh & Kamyab (2011) used the price to rent ratio as a housing price bubble measurement indicator, to show that the monetary policies and the price of properties are one of the important and effecting factors in forming the housing price bubbles.

Alavi (2002) have used the VAR model to evaluate the effects of rent, facilities, constructing materials and taxes on the housing market cycles, and he showed that the banking facilities are the most important in housing cycle.

Soltani (2002) used an OLS model with four variables to show that; the oil incomes have created the most shocks in Iran's housing prices between 1971 and 2001.

3- Theoretical Background

The return of housing prices is calculated from the total rent and the relative changes of housing prices (Goodhard, & Hofmann, 2008). Various factors affect the housing returns. So there is a two sided relationship between the macroeconomics variables and the housing return in the international level (Adams, & Fuss, 2010; Funke, & Paetz, 2013). The importance of constructing sector is such that, for rvery 52 square meters of housing, a job will be created directly (Abasinezhad & Yari, 2011). Figure 1 shows the contribution of the building sector to employment in Iran.

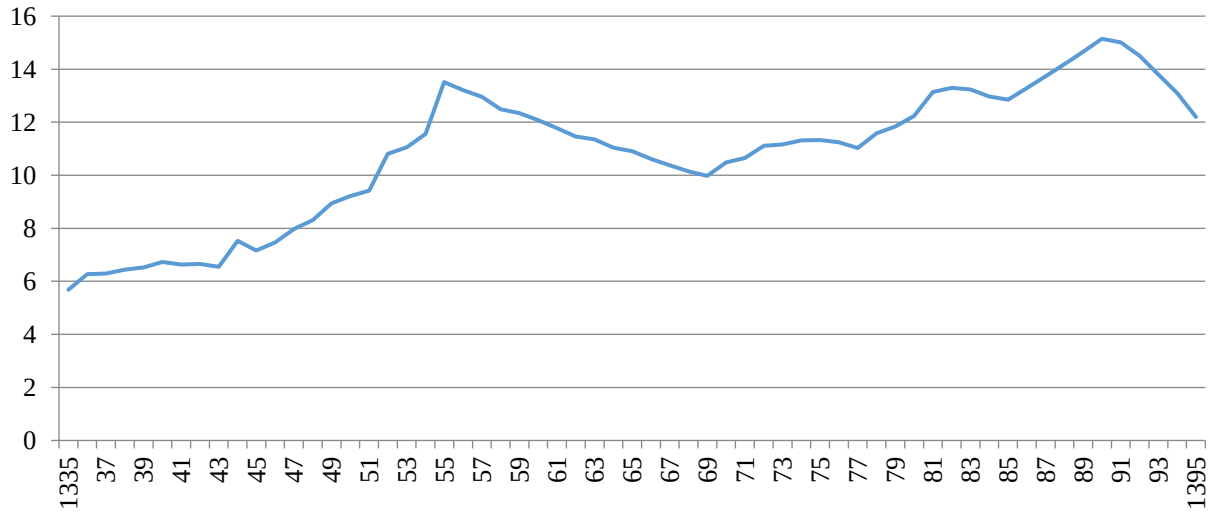

Fig1. The housing sector's share of occupation in Iran (1956-2017)
Source: (Management and Planning Organization and different economic reports)

Over the past decades, the housing sector had the most fluctuations among different financial properties (Khabazzadeh & Nafisi, 2012). The housing fluctuations can be due to the other sector's fluctuations. (Goodhart & Hofmann, 2007) in Iran's economy, oil sector has the most shock on housing sector, especially on housing

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prices (Soltani, 2002). The statistics show that during the 1991-2017 there have been four periods of housing prices (Ablolhassani et al., 2017). The issue of volatility and pricing fluctuations and housing returns, especially in metropolitans can be regarded as the most prominent feature of this important economic sector (Nasrollahi & Gholami, 2014), most of which is due to the expansion of urban housing structure and demographics in Iran. The cyclic fluctuations in housing sector and national economy, a change in consumers and producers' behavior, diversion in allocating the economic resources, intensifying the transfer of capital in the market of properties, a change in the pattern of incomes and an imbalance in the resources and expenditures of the banking system are some of the important consequences of fluctuating in housing prices (housing bubble), which has a direct impact on housing return (Gholizadeh & Kamyab, 2010). Demand surplus in recent decades has led to an increase growth with several bubble periods in pricings and housing returns (Shahabadi and Ganji, 1393). The continuation of surplus in housing market have transferred to the rent market because of the decrease in purchase power of the buyers, so with the recession in housing deals and a decrease in housing prices, the housing rental index had an increasing growth (Abolhasani et al., 2017). Fig (2) shows the growth of housing sector between 1960 and 2017.

The given facilities to housing market do not have a clear goal in Iran, and allocating these facilities is not clear for supply or demand (Mousavi, 1997). The most important causes of unusual fluctuations in housing prices (housing bubble) is the continuation of low interest rates for long-terms (Heydari & Souri, 2010). The growth of risky mortgage loans is due to the extreme facilities in giving these loans and creating an environment for speculations in housing market (Derakhshan, 2008). The housing facilities have led to an increase in speculation for housing (Goodhart & Hofmman, 2008). There is a consensus that one of the key factors in determining the housing prices increases in most of the countries is the decrease of interest rates in recent economic depression (Gimeno & Martinez, 2010).

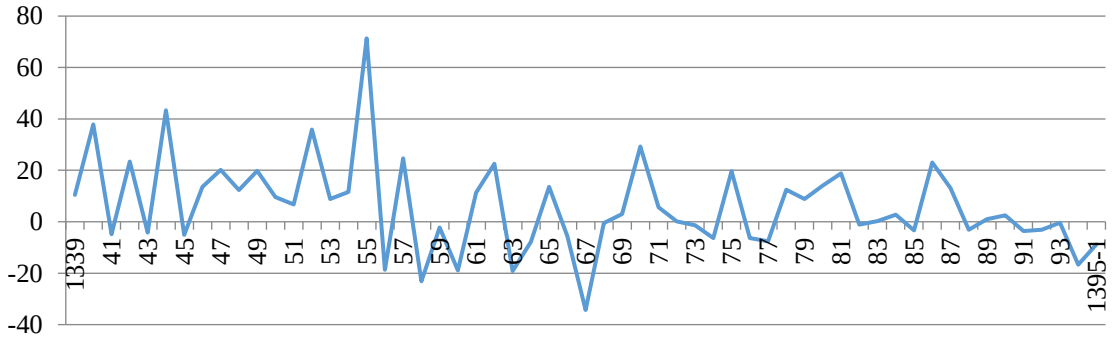

Fig2. The growth of value added in housing sector with the fixed prices of 2004 (1960-2017)
Source: (Statistical Center of Iran)

The increase in liquidity have led to a decrease in Rial value and an increase in tradable good's price, which ultimately will lead to a movement in capital from

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tradable goods to the non-tradable goods, which will cause speculation, an increase in prices and housing returns (Apergis & Rezitis, 2003). Increasing liquidity id one of the main reasons of Iran's housing price bubbles (Gholizadeh & Kamyab, 2008). The most important theory between the positive liquidity and the price of properties, especially the housing is the monetary theory (Adalid & Detken, 2007). According to the theory of optimal allocation of properties in portfolio based on the relative prices, the increase of money supply will lead to an increase in goods' prices, the economic experts understand that the real value of money is decreasing, and in order to prevent the decrease of this value, they change it to physical properties, and in this case growing demand for physical properties such as land and building will increase its cost (Elbourne, 2008). Perhaps one of the reasons for the reception of private sector in Iran's housing market investment, was the average inflation of 59.19 percent of housing sector in the last 25 years, however the growth of prices was more extreme in the suburbs, because of the change in the use of agricultural lands and forests to urban lands. The results of different studies show the positive relationship between the GDP cycles and the housing cycles (Leamer, 2007). Also, due to the 20 percent share of the oil in Iran's GDP in last decades (economic indicators, 2017), the positive relationship of the oil cycles and the housing cycles can't be rejected (Egret and carol, 2008). The housing sector can be analyzed by the Dutch disease because of providing goods and non-tradable services, so that in economy the housing and land will be affected by the Dutch disease and the hypocrisy of resources hypothesis will change from one consumable good to a high-return capital good (Bahrami & Aslani, 2012). Based on the Dutch disease, with an increase in the national money value in the periods of high revenues of oil and gas, the price of tradable goods such as non-oil exports and agricultural/industrial productions will decrease and the domestic production will be stopped because of cheap exports and the domestic capitals will be directed toward the non- tradable goods like services and housing and their prices will increase. Also with a decrease in oil revenues and tradable goods, the price of these goods will increase and because the domestic production was stopped in previous stage, inflation and decrease of national money value will cause an increase in capital goods such as land and housing, which will lead to an increase in non-tradable goods' price and if this phenomenon led to the housing price bubble, it can inject a deep depression to the market by bubble depletion. Therefore, the oil revenue fluctuations can threat the economic growth with entering to the cycle of consumable goods, increasing the low return investments, increasing the rents activities and weakening the national productions in ling-terms and it also can induct a vast fluctuation to the housing market (Egret & Carol, 2008). Also in production side, the labor force and capital will be absorbed by the oil sector and tradable good's business and the supply of non-tradable goods will decrease, also the false and short-term returns and, non-tradable goods, will increase the cost of wages and rents, so the cost of producing in housing sector will increase. In total, the cost of land and building will increase severely, so it can absorb the capital and labor force while

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decreasing the oil revenues, and then the effect of housing incomes will become positive and it will be called as expenses (Nasrollahi et al., 2005). In other words the effect of expenses indicates that; the increase in prices which is because of whole country's expenses after an increase in oil revenues, can be amended in tradable goods by increasing the imports, but in non-tradable goods in which imports are not possible, the increase will be more severe and developed (Abasinezhad and Yari, 2010). Cordon (1984) have named the Dutch disease as the "resource mobilization" and he says that the growth of oil sector in oil-rich countries has two main effects: first, the direct deindustrialization effect and second the anti-industry effect have led to an increase in tradable goods (Cordon, 1984). But of course the relationship between the housing sector as a leading sector in economics and other economical parts has not been rejected in different studies (Green, 1987; Coulson & Kim, 2002); (Gholizadeh & Akbari, 2010). The private sector's investment in housing sector is under the influence of relative return rate (Gareis, & Mayer, 2013). The housing market's return is under the influence of return rates in parallel markets, such as monetary market (especially the bank deposits), capital market, exchange market and the gold market (Nasrollahi et al, 2013). Reducing the monetary market's interest rate following an expansionary monetary policy, will cause a decrease in bank deposits and people will increase their financial power and investment by taking loans from banks and investing in financial properties (Calza et al., 2013). The private sector's investment in housing in compare to the non-housing sectors has more effect on economic growth (Green, 1987; Coulson & Kim, 2002). In a Keynesian approach, investing in housing sector will increase the effective demands in a direct way, and in the supply side the economics will increase the need for labor force and services for newly built houses, this process will lead to an upward movement in supply curve on the whole Keynesian approach, which will increase the economic growth (Funke, & Paetz, 3013). Also, in a neoclassical approach, the increase of private sector's investing in housing will lead to strengthening the physical health, educational success and a reduction in absolute poverty by providing shelter to economic agents and improve the positive expectations toward the future of economy which can led to an increase in the productivity of labor force and the movement of the curve to the right side. Housing is fundamental commodity and it doesn't have a successor and generally the economic agents keep it safe because of not wanting to maintain the higher risks in other sectors (Abasinezhad & Yari, 2009). The relation between pricing and housing returns and credit facilities is one of the important considered results of policymakers in implementing the monetary policies in housing sector (Greef, & Haas, 2000).performing the credit facilities without considering the theoretical foundations and its effects on inflation and the growth of housing sector can have harmful consequences in housing economics and country's economy (Gholizadeh & Bakhtiari, 2013). According to the housing economics theories, the housing facilities can have a reverse effect on housing returns based on the effect that they have on the supply or demands for newly built houses. Housing facilities can help the purchasing power and increase the demand for housing. In contract facilities can lead to an increase

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in supply and a decrease in housing prices which has a negative effect on housing returns (Calza et al., 2013). The housing sector is a good place for wandering capitals, speculations, underground economics and especially money laundering. In addition, the effects of behavioral economics in housing returns are evident in this market like the effect of resistance toward losses, it can be said that investing in housing sector endures more losses that benefits. (Khiayabani, 2003).

4- Research Methodology

The return housing model is explained based on the experimental studies, especially the studies of Khalili-Araghi & Rahmani (2002), Abasinezhad & Yari (2009), Gholozadeh & Kamyab (2010), Shahbazi & Kalantari (2011) and Gholizadeh & Bakhtiyari (2012) as follow:

$$\text{Return}_t = \alpha_0 + \alpha_1 \text{Return}_{t-1} + \alpha_2 \text{oilshock}_t + \alpha_3 \text{gm2}_t + \alpha_4 \text{grinvest}_t + \alpha_5 \text{gfin}_t + \varepsilon_t \quad (1)$$

In which the return of housing (Return_t) is a function of a pause (Return_{t-1}), oil price shock (OilShock_t), liquidity growth (gm2_t), the private sector's investment in housing (grinvest_t) and the growth of banking facilities (gfin_t). Also the ε_t is the error or the regressions. The housing return variable is calculated from the growth in rent prices. The oil price shock was extracted by Hodrick-Perscott filter, by which the crude oil price will be divided from its cycles and the oil price cycles will be considered as the oil price shock. The liquidity growth is also calculated based on the growth rate of monetary definition (M_2). The used data were extracted from statistic center, Central Bank, and the planning and budgeting organization. Because the housing market of Iran has trading cycles like other financial and properties market, and it has faced many changes and fluctuations over the past years, in order to model it and use the return fluctuations with Marcov-Switching GARCH was applied for the housing return equation:

$$\text{Return}_t^i = \alpha_0^i + \alpha_1 \text{Return}_{t-1} + \alpha_2 \text{oilshock}_t + \alpha_3 \text{gm2}_t + \alpha_4 \text{grinvest}_t + \alpha_5 \text{gfin}_t + \vartheta_t^i \sqrt{h_t^i} \quad (2)$$

$$h_t^i = \rho_0{}^i + \rho_1{}^i \varepsilon_{t-1}^2 + \rho_2{}^i h_{t-1}^i \quad (3)$$

In which h_(t-1) is an independent average of past functional variances' condition. In fact, in switching regime, is h_(t-1) become also dependent on the past conditions of $\tilde{s}$_(t-1), means that if h_(t-1)^((i)) have the i index, the n parameter should be calculated because in that h_(t-1)^((i)) will be dependent on h_(t-2)^((i)) ,and h_(t-2)^((i)) will be dependent on h_(t-3)^((i)) and … and estimating the parameters in this situation won't be possible. So a simple process will be applied for preventing the functional variances become a function for all of the past conditions. Kllassen (2002) has introduced the following functional variance in order to prevent this problem:

$$h_t^{(i)} = \rho_0^{(i)} + \rho_1^{(i)} \varepsilon_{t-1}^2 + \rho_2^{(i)} E_{t-1}\left\{h_{t-1}^{(i)} \middle| s_t\right\} \quad (4)$$

The expected hope of the above mentioned sentence will be calculated as follow:

$$E_{t-1}\left\{h_{t-1}^{(i)} \middle| s_t\right\} = \tilde{p}_{ii,t-1}\left[(\mu_{t-1}^{(i)})^2 + h_{t-1}^{(i)}\right] + \tilde{p}_{ji,t-1}\left[(\mu_{t-1}^{(j)})^2 + h_{t-1}^{(j)}\right] - \left[\tilde{p}_{ii,t-1}\mu_{t-1}^{(i)} + \tilde{p}_{j,it-1}\mu_{t-1}^{(j)}\right]^2 \quad (5)$$

The probabilities will be calculated as (6):

$$\tilde{p}_{ji,t} = \Pr(s_t = j | s_{t+1} = i, \zeta_{t-1}) = \frac{p_{ji}\Pr(s_t = j|\zeta_{t-1})}{\Pr(s_{t+1} = i\zeta_{t-1})} = \frac{p_{ji}p_{j,t}}{p_{i,t+1}} \quad (6)$$

Because there is no serial correlation among the returns, the h level anticipating

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in front of the fluctuations can be calculated at T-1 time as in (7):

$$\hat{h}_{T,T+h} = \sum_{\tau=1}^{h} \hat{h}_{T,T+\tau} = \sum_{\tau=1}^{h} \sum_{i=1}^{2} \Pr(s_\tau = i|\zeta_{T-1}) \hat{h}^{(i)}_{T,T+\tau} \quad (7)$$

In which $\hat{h}_{T,T+h}$ is the fluctuation anticipation of T time for h level after and $\hat{h}_{T,T+h}$ shows the anticipation of τ fluctuations will be calculated in affront level in i regime at T time as follow:

$$\hat{h}^{(i)}_{T,T+\tau} = \alpha_0^{(i)} + (\alpha_1^{(i)} + \beta_1^{(i)}) E_T\left\{\hat{h}^{(i)}_{T,T+\tau-1} | s_{T+\tau}\right\} \quad (8)$$

Therefore, anticipating different levels in front of the fluctuations will be calculated as a weight average in different levels in each regime as the weights are the probabilities in anticipating. The fluctuation anticipating of each regime will be calculated by a GAERCH as the fluctuation hopes of previous period will be calculated by giving weight to the previous fluctuations in equation number 6. Generally, in order to calculate the fluctuations, the filter probability (paved) τ of the front period will be needed (Nademi, 2014). In Marcov regime switching a necessary element for maximum likelihood, testing will be the anticipation probability. The probability of locating in the first regime at T time by the information of t-1 will be as follow: (Marcucci; 2005, Klaassen; 2002, Gray; 1996).

$$p_{0,t} = Pr[s_t = 0|\zeta_{t-1}]$$
$$p_{1,t} = Pr[s_t = 1|\zeta_{t-1}]$$
$$p_{2,t} = Pr[s_t = 2|\zeta_{t-1}]$$

The logarithm function can be written as 9:

$$l = \sum_{t=-R+w+1}^{T+w} log\big[p_{0,t} f(return_t|s_t = 0) + p_{1,t} f(return_t|s_t = 1) + p_{2,t} f(return_t|s_t = 2)\big] \quad (9)$$

As w=0,1,…,n and the housing return functional will occur because of i regime being at t time. The truth testing function No. 9 will be maximized by the numeral calculations. In this article the time period of 1981 to 2016 is included. The location of this research is the housing market in Iran's economy.

5- Results

Before model estimating, it is necessary to ensure the durability of the model's variables. For this purpose the Zivot and Andrew root test was used and the results of this test are provided in table No. 1. The reason of selecting this test was considering the structural failure of the root test because Iran's economy and its housing market have been affected by different factors such as war, sanction, oil shocks, etc. therefore using a test considering the structural failure can have better performance and accuracy compare to other tests.

Table1. The results of Zivot & Andrew test

Variable	P-value	Test result
Housing return	0.00	Durable
First pause of housing returns	0.02	Durable
Oil shock	0.00	Durable
Liquidity growth	0.03	Durable
The growth in private sector's investing	0.00	Durable
The growth in banking facilities for housing	0.04	Durable

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The results of the Zivot & Andrew durability test shows that all the variables are durable at the level of 5%, so the housing returns model can be calculated by the Marcov-Switching GARCH model. The results of Marcov-Switching GARCH model are illustrated in table 2.

Table2. The results of Marcov-switching GARCH model

Variable	The calculated coefficient	P-Value
y-intercept of return equation (functional average equation) in 0 regime	0.040	0.00
y-intercept of return equation (functional average equation) in 1 regime	0.020	0.00
y-intercept of return equation (functional average equation) in 2 regime	0.112	0.00
First pause in housing rent returns	0.58	0.00
Oil shock	0.0009	0.00
Liquidity growth	0.104	0.00
The growth of private sector's investing in housing sector	0.087	0.00
The growth of Maskan Bank facilities	-0.036	0.00
y-intercept from GARCH equation (functional variance) in 0 regime	0.0001	0.00
y-intercept from GARCH equation (functional variance) in 1 regime	0.012	0.00
$\boldsymbol{\varepsilon_{t-1}^2}$ in regime 0	0.000016	0.00
$\boldsymbol{\varepsilon_{t-1}^2}$ in regime 1	0.000017	0.00
$\boldsymbol{\varepsilon_{t-1}^2}$ in regime 2	0.00000001	0.00
$\boldsymbol{E_{t-1}\left\{h_{t-1}^{(i)} \middle\| s_t\right\}}$ in regime 0	0.859	0.00
$\boldsymbol{E_{t-1}\left\{h_{t-1}^{(i)} \middle\| s_t\right\}}$ in regime 1	0.863	0.00
$\boldsymbol{E_{t-1}\left\{h_{t-1}^{(i)} \middle\| s_t\right\}}$ in regime 2	0.222	0.00
likelihood testing Logarithm	91.36	
Hansen's likelihood testing	P-Value= 0.00 Chi^2= 43.31	
Lines normalization test	P-Value=0.27 Chi^2= 2.62	
Variance Heterogeneity test ARCH	P-Value=0.61 F= 0.27	
Portmanteau Self-cohesion test	P-Value=0.30 Chi^2= 4.837	

The results of housing returns model with Marcov-switching GARCH can be summarized as follow:

The housing returns of Iran have three; high returns (regime 2 with an average return of 11.2%), medium return (regime 0 with an average return of 4%) and low returns (regime 1 with an average return of 2%). In addition, the return variance of housing or the volatility of housing returns (return fluctuations) is different in each of the mentioned regimes and it has been modeled by three different GARCH equations in these three regimes. As the validity in housing return in regimes with low housing returns is more than the validity return in regimes with high returns. In other words, while the low housing returns which can be seen in market's stagnation, the fluctuations or the volatility return is very high and if the volatility return has been considered as a criteria of investing in housing sector – which is normal in financial literature – it can be said that the investing risks in regimes has a lower return or it is high in the stagnation period. The investing risk in housing while the boom period (high return regime) and in the medium returns period shows low numbers, so in sum it can be said that with an increase in medium returns of housing market and the movements in market, the risk of housing returns will decrease so investing in housing sector will become attractive. From the statistics perspective, the results

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of Hansen likelihood ratio test (1992) shows that the hypothesis of three regimes in housing sector is a reliable hypothesis, because the liner hypothesis or the single regime housing return cannot be accepted for 5% level. Also the three regimes of housing market are interrelated and the possibility of transfers between the three regimes is shown at the transfer possibilities matrix:

$$\begin{bmatrix} p_{00} & p_{10} & p_{20} \\ p_{01} & p_{11} & p_{21} \\ p_{02} & p_{12} & p_{22} \end{bmatrix} = \begin{bmatrix} 0.71 & 0.06 & 0.44 \\ 0.19 & 0.93 & 0.06 \\ 0.10 & 0.01 & 0.50 \end{bmatrix}$$

This matrix shows that the probability of durability in medium housing returns (p_{00}), the probability of durability in low housing returns (p_{11}) and the probability of durability in high returns (p_{22}) is about 71%, 93% and 50%. Also, the probability of transfer from lower regimes to the higher ones (p_{12}) is calculated about 1% and a contrast probability, means a transfer from the higher returns to the lower ones (p_{21}) is calculated about 6%. Also the probability of transfer from medium regimes to the higher ones (p_{02}) is calculated about 10% and its diverse probability, means a transfer from higher returns to the lower ones (p_{20}) is calculated about 44%. Finally the transfer probability of medium return regimes to lower rates (p_{01})is calculated about 19% and its diverse, means a transfer from lower returns to the medium ones (p_{10}) is calculated about 6%. Also from 35 years in research period, 13 years of it was the housing returns in medium returns regime which includes a return of 4 years. In this period, the housing market was low for 20 years and the average durability in this low return was about 10 years. Finally, the housing market had a high return regime only in 2 years (1995-1996). These probabilities and the years in different regimes are illustrated in Figure (3). Fig (3) shows the probabilities of each regime in each time and it illustrates that in each time, what is the probability of regimes, means that is it low, medium or high.

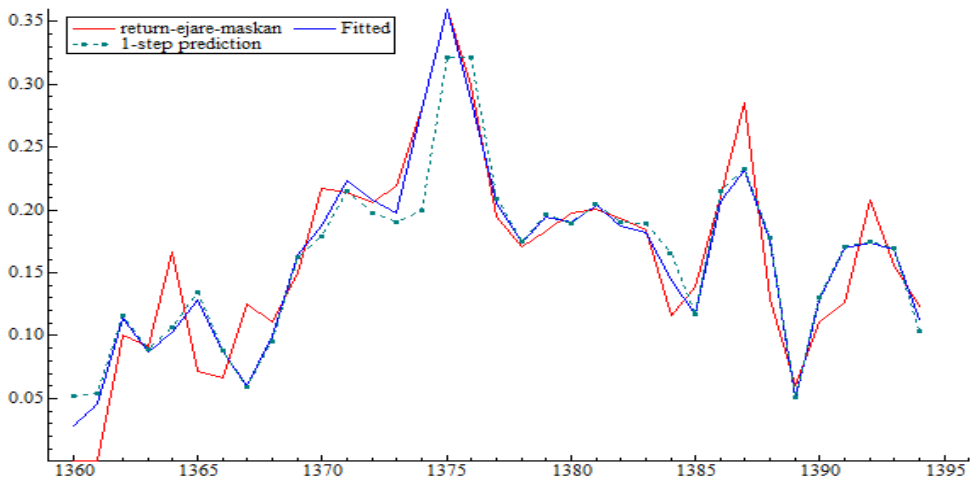

Fig3. The paved probabilities of locating in different return regimes, medium (regime 0), low (regime 1) and high returns (regime 2)

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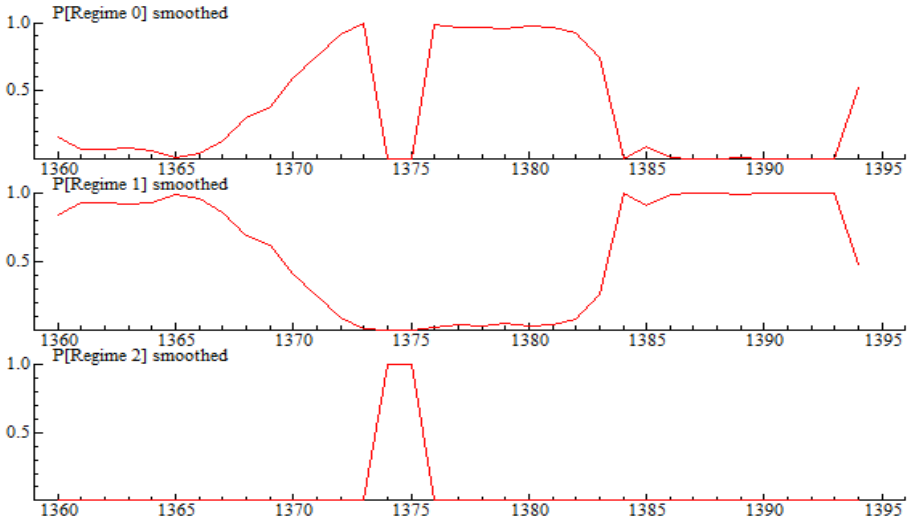

Fig4. The real and calculated returns of housing sector

Finally Fig (4) shows the real and calculated returns (by the research model) and the movements of returns were calculated correctly with the real housing returns which indicates that the Marcov-switching model has a high ability and power in showing the housing returns.

- The first pause of housing returns had a positive effect on housing returns, which shows the dynamic characteristic of housing return model. In other words, if the housing becomes positive, it is anticipated that it becomes positive in future too, and if it becomes negative in the current year, it is anticipated that it will become negative in future too. In other words, the periods of economic stagnation and boom have memories more than a period, and this reality is confirmed in transfer probabilities. In addition, the returns of current period will be considered as a criterion from future anticipations which will indicate the comparative anticipation of the economical activists in housing market.

- Oil shock has a significant and positive impact on the housing returns, although these positive effects were small. In other worlds, the positive shocks of can be seen as an increase in oil price in the market and it can be transferred to the market by the effect of Dutch disease and it can increase the housing returns. When a positive oil shock happens, the government causes an increase in demand of the whole economy by injecting the oil dollars to the economy with the mechanism of increasing the expenses of the government and this increase will include both the tradable and non-tradable goods, but because the tradable goods can be imported, their price will not change much in the situation of controlled exchange rate- (because of various exchange sources in result of positive oil shock)- and importing various goods will resolve the high demands in economy, but in the side of non-tradable goods like housing and land, because these goods can't be imported and their supply is limited, the created surplus of demands will cause a very severe increase in the prices of housing and lands, so the cost of non-tradable goods will increase in compare to the tradable goods which will cause high profits and returns in housing

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sector. Therefore, the positive oil shock will increase the returns of housing sector.

- The liquidity growth has a positive and significant impact on the housing returns. The liquidity growth by an increase in goods demand, housing and land will increase the general level of prices and services; especially in housing sector, an increase in non-tradable goods like housing sector will result in prices increase, because the demands are Irrevocable compare to the tradable goods, so the returns in housing sector will increase more than other sectors.

- A growth in private sector's investing has a positive and significant impact on the returns which shows the high potential of housing sector for private sector's investing, because the growth of private sector's investing in this sector not only has not decrease the housing returns, but it also has increased it by more housing deals. Although the structural reason of housing sector being profitable returns to the Dutch disease in Iran's economy, which can improve return more than any other factors.

- The growth of Maskan Bank Facilities had a negative and significant impact on housing returns. First of all, it should be mentioned that the growth of Maskan Bank facilities can cause a boom in housing market by increasing the housing demands and results in a high return, but the reason behind this negative impact is the huge facilities of Maskan-e Mehr project which was started from 2007 and it is in the process. This project caused a severe increase in construction of different cities by huge investments and giving cheap facilities with governmental costs to different strata of people and it provided a huge amount of houses to the demander. This severe increase and the cheap reaction to the high demands of housing brought negative impacts for housing sector.

- The determining test of this test includes the normality of errors, Variance Heterogeneity test ARCH, and the portmanteau self-cohesion test show the normality of the regression errors, variance's heterogeneity of the errors and the lack of self-cohesion between the errors.

6- Conclusion and Discussion

Considering the importance of housing market in Iran, this research wants to analyze the housing cycles with an affirmation of the oil shocks on the housing returns. In this regard and based on the theoretical framework and literature review, the affecting factors on housing sector were modeled. In addition, in order to analyze the housing sector cycles and considering the depression and boom periods and the fluctuations of housing sector, the Marcov-switching GARCH was used. In Hansen, linear test the housing return was considered as three regimes. From the theoretic dimension, these three regimes were affirmed in Iran's housing sector. The results of Marcov-switching GARCH indicate that housing returns has three regimes of high returns, medium returns and low returns. Also housing variance or housing returns fluctuations (return fluctuations) is different in each of the mentioned regimes, which is modeled as three different Marcov-switching GARCH. The housing return fluctuation in low housing returns is more than medium and high returns. Also from the 35 years in this research - 1981 to 2016 – 13 years of this period is considered as medium returns regimes, 20 years as low returns regime

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and just 2 years (1994-1995) are considered as high-level regimes. Oil shocks have a positive and meaningful effect on the housing returns, which are in line with the findings of Khalili, and Araghi & Rahmani (2001), Abolhasani et al., (2017). In other words, the positive oil shocks that can be seen as an increase in oil cost are happened because of Dutch disease. Also the first variables of housing returns, growth of liquidity and the growth of private sector's investing have positive and meaningful effect on housing return and these results are related to the studies of Epergiz & Ritiz (2003), Gholizadeh & Kamyab (2011) while the growth of Maskan bank facilities has negative and meaningful effect because of Maskan-e Mehr, which indicates that government's interference by facilities in housing market has a negative effect on the profits of this sector based on the classic theories. Moreover, these results are in contrast with the study findings of Gholizadeh & Bakhtiyari (2013) but it is related to the findings of Calza et al., (2013). Thus, the main hypothesis of this research will not be rejected and the oil incomes will affect the housing market as an exogenous shock and hey will increase the house investments.

Based on the findings it is suggested that the government prevents the transfer of new shocks to the market by managing the oil price shocks and tries to empower the private sector for investing instead of a direct interference in the market.

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7- References

Abasinezhad, H., Yari, H. (2009). Examining the effective interest rates on private sector investing in long–term, *Journal of Economic Researches,9*(1), 59-77. (In Persian).

Abolhassani, A., Ebrahimi, I., Pourkazemi, M., & Bahraminia, E. (2016) the monetary and oil changes effects on the production and inflation of housing sector in Iran: the general accidental Neo-Keynesian approach, *researches of economic development growth, 7*(25), 113-132. (In Persian).

Adams, Z., & Füss, R. (2010). Macroeconomic determinants of international housing markets. *Journal of Housing Economics*, *19*(1), 38-50.

Al-Mawali, N., Hasim, H. M., & Al-Busaidi, K. (2016). Modelling the impact of the oil sector on the economy of sultanate of Oman. *International Journal of Energy Economics and Policy*, *6*(1), 120-127.

Apergis, N. (2003). Housing prices and macroeconomic factors: prospects within the European Monetary Union. *International real estate review*, *6*(1), 63-74.

Aram, A., Aram, S., Ghnbari, A. (2011). Examining short-term and long-term effects on housing bubble price in Iran, *first urban economy conference in Iran*, Mashhad, and Ferdowsi University of Mashhad. (In Persian).

Bahrami, J., & Aslani, P. (2011), examining the oil shocks on private sector investing in housing with a general balanced pattern based on the real business, *Economic Modeling Research, 1*(4), 57-82. (In Persian).

Beltratti, A., & Morana, C. (2010). International house prices and macroeconomic fluctuations. *Journal of Banking & Finance*, *34*(3), 533-545.

Calza, A., Monacelli, T., & Stracca, L. (2013). Housing finance and monetary policy. *Journal of the European Economic Association*, *11*(suppl_1), 101-122.

Corden, W. M. (1984). Booming sector and Dutch disease economics: survey and

[DOR: 20.1001.1.23452870.1397.7.25.6.8]

consolidation. *oxford economic Papers*, *36*(3), 359-380.

Demary, M. (2010). The Interplay between Output, Inflation, Interest Rates and House Prices: International Evidence. *Journal of Property Research, 27*(1), 1-17.

Derakhshan, M. (2008). *The nature and causes of the 2008 financial crisis and its impact on the Iranian economy*. Tehran: Center for Strategic Research of the Expediency Council. (In Persian).

Egert, B., & Carol S. (2008). Dutch Disease Scare in Kazakhstan: Is it real?, *Open Economies Review, 19*(2), 147-156.

Elbourne, A. (2008). The UK housing market and the monetary policy transmission mechanism: An SVAR approach. *Journal of Housing Economics*, *17*(1), 65-87.

Funke, M., & Paetz, M. (2013). Housing prices and the business cycle: An empirical application to Hong Kong. *Journal of Housing Economics*, *22*(1), 62-76.

Gholizadeh, A., & Bakhtiyari, S. (2012). The effect of credits on housing prices in Iran, *Journal of Applied Economic Studies, 1*(3), 159-179. (In Persian).

Gholizadeh, A., Akbarian, H. (2010) housing investment and economic growth, *Journal of Qualitative Economy* (Economic Analysis Journal), 7(1), 105-133.(In Persian).

Gholizadeh, A., Kamyab, B. (2010) examining the effects of monetary policies on housing price bubble: interrelated studies, *Economic Researches*, *45*(3), 1-21.(In Persian).

Gimeno, R., & Martinez-Carrascal, C. (2010). The relationship between house prices and house purchase loans: The Spanish case. *Journal of Banking & Finance*, *34*(8), 1849-1855.

Goodhart, C., & Hofmann, B. (2008). House prices, money, credit, and the macroeconomy. *Oxford Review of Economic Policy*, *24*(1), 180-205.

Hansen, B. E. (1992). The Likelihood Ratio Test Under Nonstandard Conditions: Testing the Markov switching Model of GNP. *Journal of Applied Econometrics, 7*(1), 61-82.

Heydari, H., & Souri, A. (2010). Examining the relation between the bank and housing price in Iran. *Economic researches, 45*(92), 65-92. (In Persian).

Katrakilidis, C., & Trachanas, E. (2012). What drives housing price dynamics in Greece: New evidence from asymmetric ARDL cointegration. *Economic Modelling, 29*(4), 1064-1069.

Khabazzadeh, M., & Nafisi, S. (2012), examining the effect of macroeconomics on pricing effects with the use of panels' data, *first international conference on econometrics , methods and benefits,* Islamic Azad University, Sanandaj Branch. (In Persian).

Klaassen, F. (2002). Improving GARCH Volatility Forecasts with Regime-Switching GARCH. *Empirical Economics, 27*, 363-394.

Leamer, E. (2007). *Housing is the Business Cycle.* Proceedings, Federal Reserve Bank of Kansas City, 149-233.

Marcucci, J. (2005). Forecasting stock market volatility with regime-switching GARCH models. *Studies in Nonlinear Dynamics & Econometrics*, *9*(4).

Mayer, E., & Gareis, J. (2013). What drives Ireland's housing market? A Bayesian DSGE approach. *Open Economies Review, 24*(5), 919-961.

Monjazeb, M., & Moustafapour, M. (2013), examining the effects of Maskan-e mehr in Iran. Strategic and Macro Policies, 1(3), 1-15. (In Persian).

Nademi, Y. (2013), *Modeling the Return Fluctuations of Tehran Stock Market with Marcov-Switching GARCH model*, PhD dissertation on economic studies, University of Mazandaran. (In Persian).

Nasrollahi, Kh., & Azadgholami. A. (2013) An analysis of banking facilities on the housing sector of Iran's municipalities, *Process Journal*, 20(63), 15-38. (In Persian).

[DOR: 20.1001.1.23452870.1397.7.25.6.8]

Nasrollahi, Kh., Tayebi, K., Shajari, H., & Forotan, M. (2010), examining the relation between Dutch disease and the effect of banking facilities on housing sector with ARDL method, *Journal of Economic Housing*, No. 45, 50-29. (In Persian).

Padilla, M. A. (2005). *The effects of oil prices and other economic indicators on housing prices in Calgary, Canada* (Doctoral dissertation, Massachusetts Institute of Technology).

Saiz, A. (2010). The geographic determinants of housing supply. *The Quarterly Journal of Economics*, *125*(3), 1253-1296.

Shahbazi, K., Kalantari, Z. (2012), the effects of monetary and financial policies on housing market in Iran: SVAR Approach, *Journal of Economic Researches and Policies, 20*(61), 77-104. (In Persian).

Soltani, L. (2002), *Examining economic fluctuations in housing sector and its effects on business cycles in Iran.* M.A thesis, University of Tehran. (In Persian).

Yiqi, Y. (2017). *The effect of oil prices on housing prices in the Norwegian market* (Master's thesis).

[DOR: 20.1001.1.23452870.1397.7.25.6.8]