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# THE EFFECTS OF BANKING CREDIT ON THE HOUSE PRICE

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## ABSTRACT

Housing sector is regarded as the leading sector in every economy. In addition to the profound effects of socio-cultural, housing sector is also important to the economy and acts as the engine of growth and development. The relationship between housing price and credit facilities is one of the main objectives of the policy makers. And the enforcement of policies of credit facilities, regardless of theoretical framework and its effect on inflation does not provide the desired results. This paper aims to investigate the effect of the real price of housing on variables such as the new design coin, bank interest rates, and also on two virtual variables like liquidity and the facilities granted by banks to housing sector from 2001 to 2011 through employing the VECM method. The results of estimation indicate that there is a positive relationship between housing price and facilities granted by banks to housing sector. Following this, the effect of shocks on housing price and the standard deviation will be discussed. At last, conclusion and recommended guidelines will be suggested for policy makers.

*Keywords: Housing Prices, Inflation, Credit, VECM Model*

## INTRODUCTION

Nowadays, Housing is something more than a shelter. Housing market studies is important because it is an asset and provides services as a shelter. Considering the housing as an asset, the important point is that one of the economic factors` decisions is selecting the optimum portfolio in order to maximize the desirability in a long-term period. In the economy as a whole, housing is the main asset in the portfolio basket of the households. Changes in housing price will change the individual`s wealth during time followed by a change in the desirability resulted from consumption. In the other hand, given the differences in asset composition for different people, changes in housing prices will change the wealth of different people compared with each other. If housing is considered as shelter, the importance of its price fluctuation would be more for the governments because housing price fluctuation, especially rapid increases of price, are threats challenging the access of the public to housing. Looking at the housing market performance, there are continuous and sometimes intense fluctuations in housing price. There are studies on evaluating the starting point of housing price fluctuation covering some aspects of the subject. Liquidity cyclic deviations, bank system credits and governmental cost are the causes of deviations in housing indices` cycle (Khalili Araghi, 2001).

### Literature review

Studies on the underlying subject in and outside Iran are provided herein. Girouard and Blondal(2001) addressed the role of asset price in the collapse of financial market. Results of estimations emphasized on the constant and long-term relationship between bank facilities, housing price, and domestic gross production (GDP), and the effect of bank facilities on the housing price is more intense than on other properties. Mac Quinn and Reilly(2008) evaluated the role of income and rate of interest in determining the price of housing in Ireland. They assumed that demand for housing depends on the loan amount people receive for institutes and this loan depends on the disposable income and rate of interest. Results indicated that the long-term relationship is between the real price of housing and the amount of received loan. Gimeno and Martinenz(2010) studied the relationship between the housing price and house purchase

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loan. Their study was aimed at determining the deviation of these variables from their equilibrium levels using error correction model. Results indicated that both variables, in long term, are interdependent and kept being above their equilibrium level until the end of study period. Kamyab(2009), in a study, evaluation of monetary policy`s effect on the housing price bubble, examined the reaction of monetary policy to the housing price bubble using ARDL method and Iran seasonal data from 1992 to 2006. In addition to confirm the hypothesis of bubble formation with the aid of different test such as unit root and contegration as well as predicting price-to-rent ratio by ARDL method, results indicated that appropriate reaction of monetary authorities requires considering the housing price in the monetary policy rules and the entrance of this variable minimizes the variable of social loss function. Zabihi (2010), in an article, evaluation of the dynamic effect of macroeconomic factors on the fluctuations *in house prices*, studied the effect of variables such as the stock of money and GDP, consumer price index, and rate of exchange on the behavior of housing price index in Iran using error correction model. Results of model estimation from the seasonal data of 1990 to 2007 using *long-term convergence method of Johansen – Juselius* indicated that all variables have a positive and significant relationship with the housing price index.

**Model specification**

Based on the experimental analysis, this study focuses on five variables- real house- price index(PR), real price index of new design coin(CO), real banking facilities granted for housing sector(billion Rials)(MOR), rate of banking interest(R), and stock of money(M). Seasonal time series data was also considered from 2001 to 2011. Equation (1-3), which is used in this study, is as below:

$$PR_t = f(c + \alpha(CO) + \beta(MOR) + \gamma(R) + \delta(M) + \varepsilon_t) \qquad (1-3)$$

To obtain the best results, equation should be expressed logarithmically for all variables. Variation in the independent variable is written as equation (2-3) to observe the percentage of variations in the dependent variables under a percentage variation:

$$LPR_t = f(c + \alpha(LCO) + \beta(LMOR) + \gamma(LR) + \delta(LM) + \varepsilon_t) \qquad (2-3)$$

**UNIT ROOT TEST**

The most important tests for stationarity are the Dickey-Fuller Test or Augmented Dickey-Fuller Test (ADF). Both test are used in this study for stationarity (Unit Root Test). The testing procedure for the ADF test is the same as for the Dickey–Fuller test but it is applied to the model. The motivation for unit root testing and cointegration analysis arises from two key reasons. First, the risk of spurious correlation precludes the study of long-run relationships among levels of NonStationary variables using ordinary estimation methods. Second, using only first differences of the variables, i.e. stationary I (0) series, runs the risk of losing relevant information. Thus, unit root tests are necessary to examine the time series properties of the variables. If the series are found to be nonStationary, cointegration techniques should be applied to study the possible long-run dependencies among the variables, which are essential to understand the actual behavior of the variables.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \cdots + \delta_p \Delta y_{t-p} + \varepsilon_{tx} (3-3)$$

where α is a constant, β the coefficient on a time trend and *p* the lag order of the autoregressive process. Imposing the constraints α = 0 and β = 0 corresponds to modeling a random walk with a drift. The tests are similar to ADF tests, but they incorporate an automatic correction to the DF procedure to allow for auto correlated residuals. The tests usually give the same conclusions as the ADF tests, and the calculation of the test statistics is complex.

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**Table (1): Unit Root Test**

| Variable | t-Statistic | Critical values 1% | Critical values 5% | Critical values 10% |
|---|---|---|---|---|
| LCO(I) | 6.63 | -3.59 | -2.93 | -2.60 |
| LM(I) | -3.66 | -3.65 | -2.95 | -2.61 |
| LMOR(I) | -16.22 | -3.61 | -2.93 | -2.60 |
| LPR(I) | -7.11 | -3.59 | -2.93 | -2.60 |
| LR(I) | -6.36 | -3.59 | -2.93 | -2.60 |

Tables 1 report the results of ADF tests. The results suggest that all variables are nonstationary in levels and stationary in first differences, i.e. they are I (1) variables. Thus, it is reasonable to assume that all variables are actually non-stationary I (1) variables and continue our long-run cointegration analysis.

**Contegration test**
In the previous section it was noted that all three variables are stationary at first difference and can make a difference rid of the risk of false regression, but, valuable information about the variables is lost. However, the cointegration evidence estimate variables can be either on the level or through a vector error correction model (VECM). Considering that the use of differential variables provide valuable information about the variable loses, but using cointegration techniques and vector error correction model (VECM) to model solve the problem. VAR methodology is used for this purpose, as compared to the traditional approach of long-term data on the variables considered to be potential. These models are created from the equilibrium conditions, long-term relationships between variables in a dynamic adjustment . It was observed in the last section that all five variables become stationary at the first-order difference level and, by the first differentiation, we can get rid of the spurious regression, but valuable information concerning the level of variables will be lost. However, in the case of proving the contegration, variables can be fitted either at the level or through vector error correction models (VECM).

**Table 2: Cointegration Trace Test**

| Hypothesized No. of CE (s) | Trace Statistic | Critical Value 5% |
|---|---|---|
| None | 83.76320 | 69.81889 |
| At most 1 | 38.96710 | 47.85613 |
| At most 2 | 17.09013 | 29.79707 |

**Table 3: Cointegration Maximum Eigenvalue Test**

| Hypothesized No. of CE (s) | Max-Eigen Statistic | Critical Value 5% |
|---|---|---|
| None | 44.79610 | 33.87687 |
| At most 1 | 21.8769 | 27.58434 |
| At most 2 | 11.0899 | 21.13162 |

Johansen *and* Juselius eliminated the provided limitations by their method. Generally, in this method, the analysis is based on matrix $\prod$ (matrix rank) and, using two statistics of the Max-eigenvalue and Trace test, existence of contegration and the number of relationship will be identified. Results indicated that the hypothesis of the nonexistence of long-term relationship in the model is rejected because the impact value of 83/76 is greater than its critical value of 69/81 at 5% level. In addition, statistic of the Max- eigenvalue of 44/79 is greater that the critical value of 33/87 and the hypothesis H0 indicating the nonexistence of long-term relationship cannot be accepted. Based on the results, hypothesis of the existence of at most one long-term relationship at a 5% level of significance is not rejected because the value of this statistic is 38/96, which is smaller than their critical values.

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**Estimation of vector error correction model (VECM)**
Given that the optimal interval in the model is 1, differential lag of the variables in the model will be zero. In fact, VECM of the real housing price was obtained according to the existence of one long-term equation, zero lag in variables differentiation, and considering the intercept in long-term and short-term relationship.

**Table 4: Cointegration Vector**

| Cointegration Eq(LP) | LPR | LCO | DM | DMOR | LR |
|---|---|---|---|---|---|
| | 1 | -1.097629 | 2.57 E-05 | -5. 6 5 E-05 | 4.140529 |
| | | 0.84611 | 7.6e-06 | 8.3e-06 | 2.22847 |

LPR=1.097629 LCO-2.57E-05 DM+5.65E-05DMOR-4.140529LR      (4-3)
    (0.84611)    (7.6E-06)   (8.3E-06)        (2.22847)

In the Eviews.6 software, the estimated long-term relationship was automatically normalized based on one of the variables so that the individual relationship is obtained. The present long-term relationship is normalized based on the variable of the logarithm of real housing price (LPR). In the obtained long-term relationships, VECM evaluates the net effects of each descriptive variable on the dependent variable separately and, in other words, the linear relationship between variables in long-term relationships is frustrated by the estimated model. Thus, results of the cointegration analysis in the long-term relationships indicate that the new design coin price , dummy variable of liquidity, dummy variable of real banking facilities granted for housing sector, and rate of banking interest have positive and significant, negative, positive, and negative effects on the real housing price, respectively. As indicated in the relation (3-4), the dummy variable of real banking facilities granted for housing sector and the variable of new design coin price have more effect on the housing price, respectively.

**Impulse response functions of the model**
The generalized impulse response functions trace out the responsiveness of the dependent variable in the VECM to shocks to each of the variables. For each equation, a unit shock is applied to the error, and the effects upon the VECM system over ten quarters are noted.

**Table5: Impulse response function of Real house price**

| Period | LPR | LCO | DM | DMOR | LR |
|---|---|---|---|---|---|
| 1 | 0.136348 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.124102 | 0.019247 | 0.015351 | 0.006584 | -0.002801 |
| 3 | 0.116612 | 0.021830 | 0.008749 | 0.002487 | -0.006890 |
| 4 | 0.108615 | 0.028118 | 0.008916 | -0.001028 | -0.010758 |
| 5 | 0.101962 | 0.030125 | 0.006592 | -0.004828 | -0.014570 |
| 6 | 0.095737 | 0.031833 | 0.005647 | -0.008087 | -0.017957 |
| 7 | 0.090177 | 0.032206 | 0.004465 | -0.010993 | -0.020904 |
| 8 | 0.085071 | 0.032099 | 0.003652 | -0.013417 | -0.023348 |
| 9 | 0.080409 | 0.031484 | 0.002918 | -0.015411 | -0.025306 |
| 10 | 0.076113 | 0.030607 | 0.002343 | -0.016986 | -0.026802 |

As illustrated in the first column of table(5),the effect of the real housing price variations is evaluated on the inflation within one standard deviation so that if the real housing price varies within 1 standard deviation, it should be increased to 0.13 units in that period( first period).
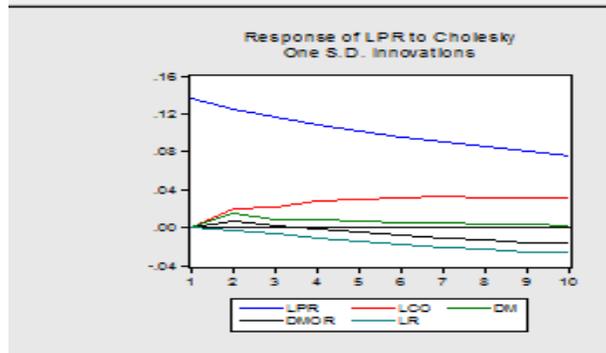
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**Figure 1: Impulse response function of Real house price**

The second column measures the coin price variable`s momentum effect upon the real housing price. As indicated, if the coin price varies within 1 standard deviation, there will be no effect on the real housing price in the first period, but in the second period, there will be a positive effect to 0/019247 units on the real housing price and this effect will increase in the next periods until the eighth one. From the eighth period onward the effect will be reduced but continue being positive.

The third column evaluates the liquidity variable`s momentum effect upon the real housing price. If liquidity increases within 1 standard deviation, it will not have any effect on the real housing price in the first period, but in the next one, it increases the real housing price to 0/015 units. This momentum effect is similarly interpreted in the next periods, meaning that, in fact, increase of liquidity increases the housing price. In addition, the fourth column indicates that one sudden variation within 1 standard deviation in banking facilities granted for housing sector in the second period has an effect of 0.0065 units on the real housing price. If the banking facilities increase within 1 standard deviation, it will not have any effect on the housing price in the first period, but it is observed that the positive effect of banking facilities granted for the housing sector has a negative effect from the fourth period onward.

Fifth column indicates that the sudden variation of the rate of banking interest within 1 standard deviation from second period onward is negative meaning that by increasing the real housing price, the rate of banking interest will be reduced. Results obtained from the impact reaction, in contrast with the results of explored VAR, are completely compatible with the economic theories.

**Variance analysis of the model**

The VDC provides a tool of analysis to determine the relative importance of the dependent Variable in explaining the variations in the explanatory variables. However, impulse response functions effect of the endogenous variable on the other variables in a VAR model outlined, Analysis of variance, changes in endogenous variable impulses toward another resolution. Therefore, analysis of variance, ready the model with information regarding the relative importance of each random impulses to impress variables.

**Table6: Variance Decomposition of Real house price**

| Period | S.E. | LPR | LCO | DM | DMOR | LR |
|--------|------|-----|-----|-----|------|-----|
| 1 | 0.136348 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.186143 | 98.10306 | 1.069114 | 0.680075 | 0.125111 | 0.022639 |
| 3 | 0.221030 | 97.41264 | 1.733723 | 0.639013 | 0.101398 | 0.113221 |
| 4 | 0.248271 | 96.34819 | 2.656783 | 0.635444 | 0.082081 | 0.277505 |
| 5 | 0.270594 | 95.30533 | 3.475944 | 0.594266 | 0.100935 | 0.523526 |
| 6 | 0.289517 | 94.18924 | 4.245370 | 0.557174 | 0.166191 | 0.842022 |
| 7 | 0.305887 | 93.06854 | 4.911658 | 0.520437 | 0.278034 | 1.221334 |
| 8 | 0.320270 | 91.95270 | 5.484892 | 0.487742 | 0.429125 | 1.645537 |
| 9 | 0.333040 | 90.86519 | 5.965995 | 0.458728 | 0.610979 | 2.099105 |
| 10 | 0.344468 | 89.81860 | 6.366200 | 0.433423 | 0.814266 | 2.567515 |

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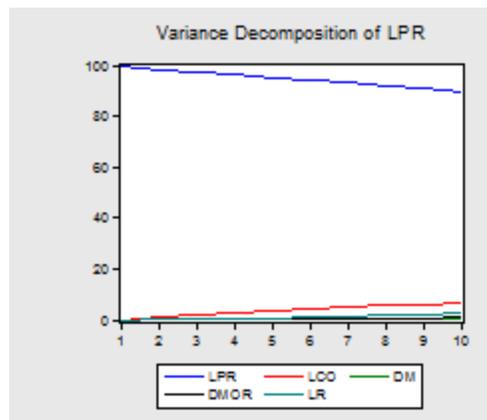


**Figure 2: Variance Decomposition of Real house price**

Given the table (6), in the first period, 100% of the real housing price variance is explained by the variable itself, but in the next periods, this explanatory will be reduced, seeing that in the tenth period (long-term) real housing price share will reach 89/81%.in the next period, coin price explains 1/069% of the real housing price variance and, by time, the share of coin price will be more than the other productions, seeing that in the tenth period(long –term, 6/3662% of the real housing price variance is explained, which is compatible with the findings of impact reaction. In the second period, liquidity explains 0/68% of the real housing price variance and will have a declining trend in next periods. In the second period, real banking facilities granted for housing sector is 0.1251 and keeps increasing until the long term, seeing that in the tenth period, it reaches to 0.8142 units. In the second period, rate of banking interest is 0.022 units, which in the mid-term (fifth period), seventh period, and long-term (tenth period) reaches to 0.5235, 1.221, and 2.5675 units, respectively.

As observed, in the very short-term period (first and second periods), coin and real housing price (itself) have the highest percent of explaining the real housing price. In mid-term (sixth and seventh periods), it is continued and in the long-term, after the variables of real housing price and coin price, rate of banking interest has the highest effect on the explanatory of real housing price.

**CONCLUSIONS AND SUGGESTIONS**

It was observed based on the results that the highest effect on the housing price is from banking facilities granted for the housing sector so paying more attention to banking and facility sectors provided by banks for the housing sector is necessary. In addition, developing a financing system of housing causes an intense increase in housing price and periodic shocks, which is of high importance. In recent years, housing price shock and jump were due to the considerable growth of credits granted for housing sector. Growth and development of housing financing system help to make housing available for households, housing sector growth, and national economy growth. In the other hand, it can be followed by an increase in housing price. As obtained in the long-term relationship, liquidity had a positive effect on the real housing price, which is because of the fact that most of people working in construction face the problem of providing liquidity. It is indicated in the results that the supplied production is low to the level of demand and this caused lack of supply for several years. This issue also causes that the share of macro mass housing constructors is lower than micro producers. In other words, given that (in the field of construction) many of individuals working in small scales and in producing residential buildings, share of individuals working in small scales is higher than those working at mass housing construction projects and these people usually have problems in financing their activities. These individuals provide this liquidity from personal capital, banking facilities, and others` money in the form of investment or debt. Because this financing way is not continuous and dynamic, this production method will be accompanied with time lapse and, thus, because production is time-consuming and individuals are not professional in it,

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end cost of house production will be increased, which is followed by an increase in hosing price. So some suggestions are indicated below.

1- Government should be involved by targeting the mass housing construction and control constructors performance so that the granted facilities do not deviate from their route. If there is a careful control, in addition to the reduction of housing cost, the problem of housing price, which is resulted from facilities directly granted for buyers, will be resolved.

2- Policy makers' effort to decrease assets demand and speculation of housing as well as improving the economic growth and introducing powerful alternatives for housing and release it from speculation can be an appropriate policy to control the real housing price fluctuation.

3- Reinforcement of housing market of credit facilities requires the reinforcement of active banking system in this sector as well as diversification of the credits, cost of credits, and financing resources such as links to the capital market.

4- Trades between countries indicated that secure and certain development of housing's financing system and the use of complementary tools of financing and monetary policies can be helpful to the constant long-term development of housing.

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