Assessment of Government Budget Deficit and Financial and Monetary Policy on Supply of Housing in Iran (Case Study: Mazandaran Province)

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Abstract
Instability of prices in the housing market is one of the problems that Iran has been faced with in recent years. It is in a way that in one period there has been a considerable increase in housing price and in another period reduction of prices or relatively high and comprehensive stability has been dominant on the housing price and thus considerable changes have been appeared in the housing sector and finally in the whole economy. the main research question is proposed in this way: what is the effect of financial debts on price stability in the supply of housing ? In this study, therefore, was to investigate the effects of financial debts on stability or instability of prices in the supply of housing. Effects of government budget deficit on price stability in the supply of housing were studied using VARX model, the related variables and data related to time period 1992-2012. The results showed that government budget deficit in short-term has no effect on house price fluctuations in Mazandaran province but it is effective in long-term. Shocks resulted from changes of housing price contain a major portion of house price fluctuations.
Kewords: Government Budget Deficit, Housing Price Index, Varx Method

Introduction
Housing is one of the key issues in economy and a significant portion of the government budget is allocated to this sector. Therefore, house price fluctuations are effective on investment of the private sector and national economy. The statistics and figures too illustrate that between 20-40 percent of investments of the country have been in this sector during the past three decades. This shows high importance of housing in development, production,

employment and economic indexes. Policy makers have always considered the housing market in order to reach two purposes, i.e. price stability and favorable unemployment level (Pourmohammadi, 2007).

Although many economists have recently asserted that the important factor which gives rise to crisis has been identified but the economic crisis which is the result of continuous progress of financial crisis has increasingly been considered again (see Bernak, 2002 & Locus, 2003). They suggested it is not unexpected that financial crisis is unpredictable by most economists. This is while some unorthodox economists were able to predict occurrence of financial crises using another group of indexes (see Kin, 2001; Rubini and Sedser, 2005). First the manner of crisis development from housing sector to debt crisis is studied in this paper.

As was mentioned earlier, financial crisis began since 2006 when the housing price in the US started to decrease. Due to this, those who received housing loans were not able to repay their debts and thus banks became bankrupted. Value of other assets was also decreased which was led to a crisis.

As a result, repayment ability of borrowers was reduced. Due to decreased value of bank assets a major loss was incurred on banks which paved the way for occurrence of banking crisis. Banks were not able to continue their activity by such process (lack of certainty in future and inadequate capital).

The government had to take action for reinvestment of banks to capture some low-value loans. Moreover, unintentional and automatic stabilizers such as increased unemployment enhanced budget deficit in this economic stagnation. In order to supply the expenses, the government had to appeal to borrowing again. In spite of government attempts, banks did not decrease their borrowing which seemed to be highly risky. Besides, debtors were prepared to pay their debts faster than its accumulation and the potential debtors preferred to postpone their borrowing due to lack of confidence in future. Hence, the real sector of economy cannot be repaired and the government has to follow it too. All these can be led to a debt crisis.

The government must accept some degree of abstinence and difficulty in order to overcome debt crisis and confront it. Anyway, it is acceptable that more abstinence decreases economic activities especially in the private sector. As it is observed debt is regarded as a key factor.

On the other side, housing sector is the focus of statesmen too, because continuity of housing challenge is effective on development of social dissatisfactions besides economic abnormalities. A considerable number of urban households have to relinquish most of their necessary expenses such as hygiene, nutrition and education in order to supply the rent and even buying a house. Its result is reduction of mental and physical capability of human force and thus limitation of economic growth (Karami, 2008).

Since housing plays a high capital role in our country many investors and policy makers have paid attention to this sector. House price fluctuations in Iran are affected by numerous factors. Perhaps the effect of total volume of financial debts on house price fluctuations is not so important at first; for this reason a few studies have been conducted about this issue in the housing sector. Therefore it was tried in this study to evaluate the manner and degree of effect of each variable especially total volume of debts using VARX model and considering the effective variables on housing price besides the effect of total volume of debts.

Iran's economy has a low effect on oil price, foreign exchange rate and macro-economic variables of other countries. External variables of the proposed model must be regarded as weak exogenous ones in order to design an econometrics model in the global context (it is

clear that this is impossible in VAR models). This makes clear the necessity of using VARX method which does not have the limitations of VAR model from one side and is based on the economic theory with microeconomics bases on the other side.

The present study is organized in five sections. Research literature and background are studied in section two. The model is explained in section three and analysis of results is presented in the next section. Section five contains conclusion and discussion.

Theoretical principles

Various factors are effective on variables of the housing market which can be divided into two groups of endogenous and exogenous factors. Factors that change the volume and manner of supply and demand in the housing market are endogenous factors and those that arise from cases such as inappropriate monetary and fiscal policies and total volume of debts due to market fluctuations are exogenous factors (Abbasi Nejad & Yari, 2010). Role of financial debts and house price fluctuations will be mentioned below.

Effective channels of fiscal policy on housing market variables

Changes of fiscal policy of the government affect gross national product (GNP) directly and indirectly. GNP changes might affect disposable income, income distribution, level of prices, etc. Variables of housing market too are affected by changes of each of the above variables. Generally, there are two types of different fiscal policy tools for the government: income policies and expense policies. Income or tax policies determine tax rate in personal incomes, tax rate on the profit of limited companies, tax bases, indirect rate of tax and payments of social security. According to macro-economy theories, stability of government expenses and increasing of tax rate decreases (increases) GNP. Decreasing (increasing) of GNP will affect housing market variables indirectly through changing of the above intermediate economic variables (disposable income, employment, level of prices, etc.). Theoretically, income increase due to implementation of expansionary fiscal policies affect housing supply (construction of residential buildings and residential investment) and demand and changing of housing supply and demand will change equilibrium price of housing too. Also these economic factors may affect some population variables which have tendency to affect construction of residential buildings. Similarly, public policy makers might affect GNP by increasing or decreasing of government expenses through transfer payments or purchasing of goods and services. As it was mentioned earlier, change of GNP might change construction of residential buildings so that if income is increased, it is expected that residential investment and number of housing units and thus housing supply are enhanced. Also, housing demand is increased by increasing of income; therefore, housing price may increase, decrease or remain stable by increasing of housing supply and demand following national income growth (Naylor, 1967).

On the other side, expansionary or restrictive fiscal policy can change variables of housing market by affecting general price level. Increasing of general price level has various effects on effective demand of housing. Its negative effect is appeared as decreased purchasing power of people and its positive effect is that households move towards constructing and purchasing of housing units while observing the process of price growth to maintain and stabilize value of their properties if risk level and rate of return of capital are not favorable in other economic activities. But effect of such increase at general price level on housing price depends on the kind of inflation in different years, so that instant increase of general price level along with increased cost of housing production decreases investment in housing and increases housing

price. But a long-term and chronic inflation causes this effect to become less effective (Abbasi Nejad & Yari, 2010).

Effective channels of monetary policy on housing market variables

Theoretically, monetary policy affects housing demand. First, housing price similar to other properties is sensitive to other financial assets like bonds. If yield of bonds is increased (interest rate is increased), capital holders will convert some portion of their portfolio into bonds and will avoid other properties like housing. This causes housing price to change until return of other properties becomes equal by considering different risks. Second, housing demand has a negative relation with interest rates, because interest payments constitute one part of the required expense to buy a house. Third, the price that a person is able to pay for housing has a direct relationship with the primary capability of interest payment (Elborn, 2008). As Rosen claims families are limited by means of their current income with regard to what they can borrow. The pressure of interest payment becomes less and less during the time as real wage is increased and inflation decreases real value of debt. Current interest rate is one of the important determinants of housing price. Another method that monetary policy can decrease housing price is the variable interest rate increase for houses that are sold for return of principal (Beheshti & Mohseni Zonuri, 2011).

Mishkin (2007) stated price channel of other properties based on Tobin Q theory (1969) and Modigliani's Wealth Effect (1971). He believes that monetary policy can affect the real sector by affecting properties and this is conducted by the above two theories. According to Tobin Q theory (1969), monetary policy is effective on the economy with stock exchange price. When stock exchange price is increased, it is resulted in Tobin Q increase and cost of capital decrease which increase investment demand and total production. Tobin Q theory can be used about the housing market other than the stock exchange. With regard to housing, Q can be stated as market value of housing unit on cost of construction. Indeed, when officials increase the interest rate by implementing restrictive monetary policy and create restrictions for receiving the housing loan by applicants, demand for housing and therefore market value of housing will be decreased (Sharifi Renani et al, 2012).

Also, monetary policy affects the housing market and the whole economy by increasing or decreasing of interest rates through the following channels (Mishkin, 2007): direct effect of interest rate on cost of capital, expectations of changes of the housing price in future, housing supply and indirect effect of housing sector credits on housing demand.

Effects of government budget deficit on housing price

Those who have received housing loans will be unable to repay their deficit due to reduction of housing prices. This encounters banks with budget deficit and value of other assets is decreased. The government is forced to take action and re-invests in banks to occupy their capitals. This will be led to stagnation and thus non-automatic stabilizers such as unemployment and budget deficit are increased and the government is forced to borrow to be able to compensate its debts. Therefore, given to above issues it can be concluded that house price fluctuations will be effective on debts. So debt is a key factor. Debts can be divided into two groups: public debts by the government and private debts that include total debts of credit market such as households, firms and external and financial sectors. Also, total volume of debts is sum of government and non-government debts. On the other side, debt changes as one of the monetary policy tools can affect housing price, thus a mutual relationship can be made between house price fluctuations and changes of debt volume.

Research background
External studies

Agnello and Schuknecht (2011) studied characteristics and determinants of housing bubble and collapse of it in 18 industrial countries during the period 1980-2007. In historical terms they perceived that price bubble of recent housing prices during four years are among the longest bubbles. Model estimation showed that credits and interest rates have a significant effect on probability of bubble creation and collapse.

Bernanke (2010) studied the relationship between monetary policy and housing price for US economy. Results of his studies show that the direct relationship between monetary policy and housing price increase is weak. Although rapid increasing of prices has occurred when short-term interest rates were at their lowest level but interests of housing price were more than what can be explained through the status of monetary policy. In addition, interstate evidences do not show a significant relationship.

In his article entitled "Is tax burden decrease led to housing supply increase?" Malpezzi (2002) evaluated the relationship between housing supply and paying subsidy to manufacturers. He shows in the article that population structure, urbanization and population growth are very important factors in housing supply and implementing tax reduction policy on housing supply increase is neutralized through replacement of subsidy houses by those supplied by the private sector. This is not ended in housing supply increase. It was pointed out that change of variable has not had a considerable effect on supply increase or decrease given to the low sensitivity of housing supply to housing tax.

Internal studies

Gholizade and Kamyab (2011) studied monetary policy reaction to housing bubble and concluded that monetary policies have allocated a major portion of house price fluctuations and bubble formation to themselves.

In a report entitled "Studying tax burdens of housing market in Iran" Shirkesh (2011) studied implementation of tax policy on sales in housing market during the time period 1990-2007. This kind of tax is to control speculation in this sector. He estimated housing supply and demand function in Iran and calculated tax elasticity of each one in order to fulfill this affair and determine the portion of tax burden of housing supplier and demander and the manner of effect of this policy on preventing housing price increase arising from speculative demand. The obtained results indicate high sensitivity of supplier and low sensitivity of consumer towards the price. Also high inflation effects of tax burden policies were found out.

Gholizade and Kamyab (2011) in another survey studied the effects of monetary policy on housing bubble for 18 countries including Iran using panel data method during the time period 1991-2004. The results indicate a major portion of house price fluctuations and bubble formation in Iran and countries which have ratio of price to higher rent has been allocated to monetary policy.

Ghaderi, Eslamiun and Ojimehr (2010) estimated housing investment function in an article entitled "Effective factors on housing investment in Iran" using seasonal data related to years 1997-2007. Co-integration was analyzed using two models for investment function and portfolio and vector auto-regressive method. Housing price index, liquidity volume, household income, cost of construction, foreign exchange rate, stock exchange index, deposit rate and gold coin and gold price were considered in this article as explanatory variables. The results reveal that housing price index, household income, cost of construction and foreign

exchange rate are effective on the process of investment in housing sector but given that coefficients of deposit profit rate and price of coin and gold were insignificant it was concluded that these two factors could not be regarded as rivals of housing.

Model explanation

VARX model was used in the present paper to evaluate the effect of total volume of financial debts such as government and non-government on house price fluctuations. Primary VAR models used Cholesky decomposition to obtain impulse response functions. Cholesky decomposition signifies a causal sequence and if the researcher wants to study the effects of more than one shock (monetary shock), it might be unacceptable (Elborn, 2008).

Blanchard and Bernank (1989) developed SVAR model by considering theoretical limitations of simultaneous effects of shocks. Then Clarida and Gali (1994) identified impulse response functions through theoretical limitations on long-term effects of shocks. Major advantage of SVAR models is that structural auto-regression models explicitly have an economic logic based on economic theories to execute restrictions unlike primary VAR model in which structural shocks are identified implicitly and based on taste. These limitations can be long-term or short-term. Structural shocks are obtained after executing the limitations. These shocks can be used to create impulse response functions and variance analysis to evaluate dynamic effects on different variables. VAR models in studies regarding monetary transfer mechanism which utilize Cholesky decomposition usually emphasize partial identification and relying on partial identification means that only one shock can be studied in each model (Christiana et al, 2001).

Given that domestic conditions of developing countries do not have much effect on macroeconomic variables at the international level, we are faced with a series of exogenous variables in VAR models for these countries. In fact, these variables cannot have a mutual relationship in equations system. Therefore, auto-regression co-integration models are used with exogenous variables. For instance, changes of housing price or other goods in a developing country like Iran cannot be effective on variables of foreign exchange rate and oil price at the international level and a mutual causal relation cannot be defined for such variables. Since in this paper the effect of internal and external variables on house price fluctuations in Iran is evaluated it is not possible to propose a mutual relationship among external variables (oil price and foreign exchange rate). Hence, VARX model is applied.

Pesaran et al (2000), Pesaran and Shin (2002) and Pesaran and Smith (2006) completed Johansson studies (1991-1995) and presented a method to solve the identification problem and testing hypotheses in vector auto-regressive models with weak exogenous variables and were used in this study. Unlike Johansson method in which co-integration analysis in VAR models is conducted using statistical linear constraints (normalization and statistical techniques are just solved in identification problem) in VARX method economic theory is applied to solve identification problem. In other words, long-term restrictions adopted from DSGE model can be imposed on VARX model. More clearly, techniques such as Johansson method are weak to model national economy in the global space because first-order collective exogenous variables cannot be regarded in VAR model, while there are two classes of first-order exogenous and endogenous variables in VARX method.

Considering the above-mentioned issues in the theoretical principles section, number of supplied housing units in Mazandaran province, return on investment and housing price index were used in the intended period to evaluate the effect of total volume of debts on house price fluctuations. Given that changes of oil price have tangible effects on macro-economic

variables both at the internal and external level, this variable was used. But an exogenous variable was applied in the model because using a mutual relationship among variables of housing sector in Mazandaran province and oil price is not reasonable. As monetary and fiscal policies affect housing sector directly and indirectly government debt variable was used as an index for monetary policies. Also liquidity variable in the intended period was utilized as monetary policy index. Given to what has been mentioned in section two, monetary policies affect gross domestic product and such policies influence this sector. Through changes of volume of money and thus liquidity level some additional volume of money flows toward this sector and effectiveness manner of monetary policies can be referred to in this way. Also changes of foreign exchange rate are inserted in the model as exogenous variable. Data was achieved from the Central Bank website, Department of Housing and Urban Development and the Municipality in Mazandaran province. The obtained results from generalized Dickey-Fuller test reveal that housing supply logarithm has first-order difference and other variables are of zero order and stationary at significance level 5%.

The applied variables in this study include housing price logarithm in Mazandaran province, housing supply logarithm in Mazandaran province, logarithm of return on investment in housing sector in Mazandaran province, logarithm of total private sector, logarithm of total government debts and logarithm of liquidity as endogenous variables. Also exogenous variables include foreign exchange rate and housing price logarithms. The selected model is as below:

$$X_t = C + \beta(L)X_t + \gamma(L)Z_t + U_t \qquad (1)$$

In this model X_t and Z_t are vectors of endogenous variable and exogenous variable respectively. Also U_t is the vector of error terms.

$$x_t^{'} = |LAMAS_t \ LPMAS_t \ LLIQ_t \ LBAZ_t \ LBD_t \ LBGHD_t| \qquad (2)$$

$LAMAS_t$ is housing supply logarithm in Mazandaran province, $LPMAS_t$ is housing price logarithm in Mazandaran province, $LLIQ_t$ is logarithm of liquidity level in Iran, $LLIQ_t$ is logarithm of return on investment of the housing sector in Mazandaran province, LBD_t is logarithm of government debts and $LBGHD_t$ is logarithm of debts of the private sector.

$$Z_t^{'} = |LOIL_t \ LEX_t| \qquad (3)$$

$LOIL_t$ is logarithm of oil price and LEX_t is logarithm of foreign exchange rate. $\beta(L)$ And $\gamma(L)$ are first-order interval operators. This can be known through number of data and Akaike and Schwartz statistics. Also C is vector of independent terms. Estimation results are presented in Table 1.

Numbers in the above table show the estimated coefficients in VARX model. Of course these numbers cannot be reliable and used for analysis, because they are estimated coefficients in the summarized model and given that variables were not used in the model in period t they are different from those of structure form. Most coefficients have become significant in this model and illustrate mutual relationship among endogenous variables. Even if Granger causality test cannot confirm the mutual relationship among endogenous variables, results obtained from VARX model are more reliable, since it considers other factors and does not only refer to the mutual relationship unlike Granger causality test. Results obtained from the estimated VARX model indicate there are mutual relationships among endogenous variables.

The obtained results in Table 2 show the shocks resulted from the housing price during ten recent decades. Since main purpose of this study was to investigate the effect of total volume of debts (government budget deficit) on house price fluctuations the last two columns

are focused. First the shocks resulted from housing supply, liquidity, house price fluctuations and return on investment are referred briefly. The estimated coefficients for the first period of housing supply shocks were not significant but since then they became significant. According to it, housing price shows reaction based on housing supply changes after one period. Thus, housing price has a high sensitivity towards housing supply and any change in housing supply is highly effective on the prices in periods close to that period. The second column shows shocks resulted from price changes on housing price index. The estimated coefficients for shocks are significant since the beginning. This illustrates housing price index is highly influenced by housing changes and its intensity is decreased gradually in long-term so that whatever we become closer to the tenth period, coefficient of shocks becomes smaller. It is noteworthy that if the descending order of these coefficients is disturbed in some cases, it is due to dissimilarity of data. This column shows increasing of prices in previous periods is led to increasing of prices in future periods and refers to the discussion regarding formation of price bubble in the housing market. In fact changes of prices in one period increase housing price in next periods without any reason. Column three shows shocks resulted from changes of liquidity. The estimated coefficients for these shocks were not significant up to the second period and it illustrates monetary shocks affect housing price after several periods. Results of the above table demonstrate monetary shocks have a low effect on housing price index in short-term but they are effective in the long-term. Results of this column can be used to analyze the effect of monetary policies on house price fluctuations. Some volume of money enters the housing market by increasing of liquidity and causes housing price to be changed due to liquidity increase. These changes in liquidity affect housing price changes considerably after two periods. Column four includes the effects of shocks resulted from changes of investment on housing price index. The estimated coefficients for this column were not significant up to three periods and this shows low sensitivity of housing price changes towards changes of investment in the intended period. Perhaps it's because housing played the role of a consumptive good and not a capital good in the primary periods under study. Column five refers to the shocks resulted from changes of government debts on housing price changes. The estimated coefficients were not significant for the first three periods and even they were very small in later periods despite significance of coefficients. It can be concluded that volume of government debts on housing price changes has had trivial effects in the period under study. It might be perceived that financial policies have had no efficiency in the intended period and have not been able to change housing prices. The last column shows the effect of volume of private debts on housing price changes. Most coefficients had become insignificant and it shows that the private sector has not been able to have a considerable effect on house price fluctuations in the housing market in Mazandaran province during the intended period. Therefore, any shock of the private sector debts has not been able to change housing prices.

Conclusion

Most conducted studies inside the country about the housing market are more in the field of housing price index and its price bubble. Also they have mostly been conducted at the national level. It was tried in this paper to utilize investment in the housing sector and degree of supply besides considering the housing price index. Also this was conducted as a case study in Mazandaran province that is one of its differences with other researches. Effect of government and non-government debts on the housing market was not considered in previous researches, however, it was tried here to evaluate the effect of total volume of debts

on house price fluctuations through other factors. The results obtained in this study are as the following:

Shocks resulted from housing supply changes were not significant in the first period and they affected housing market highly after this period. This shows housing price changes have a high sensitivity towards housing supply changes both in short-term and long-term. The shocks resulted from housing price changes had been significant since the beginning and show housing price changes affected house price fluctuations in the same period. These effects had been intensive in the short-term accompanied by formation of price bubble and were reduced gradually in long-term. It can be concluded that a major portion of house price fluctuations in Mazandaran province has more been affected by the price in the same period. Shocks resulted from liquidity changes had not been significant up to two periods and it means that these shocks do not have a considerable role in house price fluctuations in short-term but gradually their effect is increased in long-term. Of course it can be pointed out that a major portion of liquidity flows towards other sectors because of prosperity in rival sectors of the housing sector. Indeed it decreases the effect of liquidity shocks on the housing market. Thus, it is concluded that whatever the prosperity and output in the housing sector is increased, shocks of liquidity will affect this sector more.

The shocks resulted from changes of investment had not been significant up to three periods. This indicates that the consumptive role of housing sector in Mazandaran province has been considered more and its capital sector has been considered less in the period under study. Perhaps intensive stagnation of the housing sector in 2007 is one of the reasons for coefficients' insignificance that its rate of return was decreased to 6%.

The shocks resulted from government debts had not been significant up to three periods and since then significant coefficients were very small. This indicates that financial policies have no efficiency in the housing sector in short-term and it is very low in long-term. Perhaps it is because the case study has been performed in Mazandaran province and if it is conducted at national level, different results might be obtained.

About the shocks resulted from debts of the private sector on house price fluctuations most coefficients became insignificant and show these debts had no effect on house price fluctuations in Mazandaran province in the period under study. Probably the reason is very low portion of banking credits for housing construction and it has given rise to trivial effects of private debts on house price fluctuations. Generally, total volume of debts has had trivial effects on house price fluctuations in Mazandaran province.

Table 1-
Estimated coefficients in VARX model

	$LAMAS_{t-1}$	$LPMAS_{t-1}$	$LLIQ_{t-1}$	$LBAZ_{t-1}$	LBD_{t-1}	$LBGHD_{t-1}$	$LOIL_t$	LEX_t
$LAMAS_t$	0.56	0.079	0.58	0.033	0.21	0.412	0.341	0.198
$LPMAS_t$	1.769	0.587	1.112	0.0495	0.508	1.242	1.798	1.09
$LLIQ_t$	0.362	0.0389	0.50	0.0396	0.097	0.231	0.161	0.009
$LBAZ_t$	1.212	0.43	22.078	0.376	1.35	7.087	3.19	0.24
LBD_t	0.67	0.133	0.210	0.075	0.643	1.105	0.793	0.67
$LBGHD_t$	0.023	0.045	15.78	0.032	0.276	1.068	0.065	0.034

Source: research results

Table 2-
Variance analysis of housing price index

Period	LAMAS	LPMAS	LLIQ	LBAZ	LBD	LBGHD
1	0.132	0.354	0.0001	0.0000	0.0000	0.0002
2	0.0732	0.0276	0.0874	0.867	0.049	0.0132
3	0.067	0.3134	0.0345	0.978	0.0476	0.0342
4	0.132	0.198	0.2109	0.265	0.0008	0.0421
5	0.145	0.456	0.0376	0.179	0.0496	0.007
6	0.110	0.210	0.108	0.16	0.007	0.0178
7	0.136	0.315	0.05	0.143	0.063	0.009
8	0.059	0.236	0.082	0.149	0.0064	0.0078
9	0.0638	0.423	0.086	0.176	0.0332	0.0348
10	0.0069	0.371	0.028	0.1039	0.0481	0.008

Source: research results

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