Global financial crisis impact on gold market in Iran

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Abstract

Monetary policies are the most important macro-economic tools and acquiring enough knowledge about the method of their effect is considered as an important step in national and regional planning and development. At the present study, the effect of monetary shocks in price of Iranian coin has been investigated by using the time series data available for the years 1984 till 2014. In this regard, GARCH technique was used for modeling and calculation of the monetary shock. Similarly, the relationship of monetary shocks variable, the price of gold through world, oil revenue and foreign exchange rate with the price of coin in Iran was analyzed. The results showed that the variable of foreign exchange rate has adverse effects and the variables of monetary shock, the price of gold through world, oil revenue have direct and meaningful effect on the variable of price of Iranian coin. Therefore, the government by correct planning is able to inhibit crisis and shock in transactions especially coin and gold.

Keywords: monetary shocks, GARCH, ARDL.
Introduction

Review on economic developments through the last decades implies that the economy of Iran is always in the expose of monetary expansions and in other words, the monetary shocks. Although in this period liquidity control is one of the codified goals in the periodic plans of the country, but the heavy reliance of the budget structure of the country to the oil cause the government inevitably to increase the monetary base. Increase in money volume in economy can has various effects in nominal and real sectors. In economic literature, many discussions have been done about the role and importance of money in economic growth and development and effectiveness of monetary policies on the macro-economic variables and the role and importance of money in the economy has been reflected in them somehow. In general, stabilizing economic fluctuations and Suitable economic growth is one of the most important macroeconomic policies for all countries in such a manner that Continuous economic growth and stabilizing production and price fluctuations is one of the defining features of successful economies, since economic instability, imposes a huge cost on the economy and this instability may cause resources to be distributed and allocated inefficiently. (Akhatr and Chodari, 2003, 58).

Global Gold price fluctuations due to its considerable effect on the world economic variables, has intrigued many economists and policymakers. The fluctuations influenced especially the price of gold in different countries. The price of gold is determined on the basis of free rate of foreign exchange. It should be noted that even in the price of the coins, this price is made up of two components. One component of coin prices is for the metal value that consists of multiplying the global price by the foreign exchange rate and foreign exchange rate used in this multiplication is of the free market. The second component of the price of the coin is the mint right or, in other word, the quality right of that and this component is estimated to be negligible in normal state, but in terms of increased market demand, it is even greater than ten thousands tuman. During the last decade, there has seen drastic changes in the price of gold. Several studies have been conducted within the country and abroad on the effects of monetary and foreign exchange shock on the major economic variables, some of them are discussed in this section:

Barthez Mackouik (2007), in his article titled, “External Shocks and U.S. Monetary Policy And Macroeconomic Fluctuations”, using the vector model, showed that external shocks are an important source of macroeconomic fluctuations and affect monetary policy shocks of interest rates and foreign exchange rates strongly and rapidly and the price level and real output responded to monetary policy shocks and showed that the external shocks play more important role in explaining macroeconomic fluctuations of America than monetary shocks. Francisco and Joan (2007), in their study titled, "uncertainty of Macroeconomics and monetary shocks", investigated the uncertainty and monetary shocks. The results showed that investment and production in most sectors are affected by demand shocks and high uncertainty causes the investment and productions are sensitive to demand shocks. Maydron (2003) in a study examined the effect of economic shocks on unemployment rate of Australia. Based on the research, productivity shocks on unemployment rate had an inverse effect on the Australian economy. Similarly, an inverse relationship between shocks on the
demand side and wages and unemployment rate was proved and the effect of labor supply shock on unemployment rates was estimated positive.

Lawrence (2003), using quarterly data for London gold prices, showed that there is significant dependence between the gold price and changes in some of the macroeconomic variables such as inflation, GDP and interest rates. Kim (2001) studied the effects of monetary policy shocks on the trade balance of France, Italy and UK. The data used in this study include the foreign exchange rate, money supply, consumer price index of industrial production, commodity export price index to the domestic currency, foreign exchange rate and global level statistics. The results of this study showed that in these countries, the effect of monetary shocks is like the transition effect of expenditures on the trade balance. Kay (2001) investigated the variability of daily price returns of futures contracts of COMEX gold. Among the 23 economic variables, employment variables, CPI, GDP and personal income were introduced as the affecting factors on gold prices. Easterly et al (2000) showed in their study that in case of uncertainty, the real foreign exchange rate is another component of the degree of openness of an economy. With other conditions constant, the effect of real foreign exchange rate fluctuation on investment possibly is larger in economies that are more exposed to international trade.

Lee and Pierce (1996), using a multi-sectorial model, studied shock stability and their relative contribution in production changes of the industrial sector in the UK. Shocks in this study were divided into two groups: macro shocks and other shocks, which are included in every industry sector. Macro shocks include unexpected changes in the money supply, stock returns, foreign exchange rates and oil prices. The results of this study showed that almost share of specific shocks of in the stability of abnormalities are more important than macro shocks. Morgan (1993) in his study showed that the effects of production shocks on production and prices are asymmetric and the effect of monetary negative shocks on real output is more than positive shocks, but about effectiveness of monetary shocks on prices, the opposite case occurs.

Ehsani et al (2009) investigated the effect of foreign exchange rate instability on non-oil exports in Iran. According to the findings; the positive effect of foreign exchange rate and the negative effect of its instability on non-oil exports have been approved. Mirzayi Khalil Abadi et al (2009) has dealt with the effect of monetary shock on the growth of Iranian agriculture sector, results of which implied the weak relationship of monetary system of country and Iranian agriculture sector.

In their study of, Abrishami et al (2008) studied asymmetric effects of oil price fluctuation on economic growth in the OCED countries net exporters of crude oil. These results suggest that the decrease in oil price shock has no significant effect on production, but positive shock of oil prices significantly affect production. Mozayani (2009), in a study, examined the effects of monetary shocks on nominal and real economic variables (hard currency and trading balance) of Iran. The results indicated that the nominal foreign exchange rate are affected by monetary shock well in such a manner that foreign exchange rate reaction against an unexpected
monetary expansion appears as recurrent leap of foreign exchange rate and in long-term result primary deficit and then trading surplus. They entered as endogenous variables.

Sarfaraz and Afsar (2005) investigated the factors influencing the fluctuations of gold prices in Iran. In this study, the world price of gold, the Tehran Stock Exchange stock price, retail price index and dollar and IRR rate were considered as effective factors. Theoretically, several variables affect the price of gold, especially coins that the most important ones are: 1) monetary shock (liquidity), 2) the world price of gold 3) foreign exchange rate4) oil revenues. This study sought to examine the effects and the question that whether the incidence of positive monetary shocks, coins prices will be adjusted upward?

Materials and Methods

Autoregressive heteroskedasticity model (ARCH) was first introduced by Angle and later extended by Bolerselo to GARCH models. In the theoretical literature, ARCH and GARCH techniques known as autoregressive models to under heteroskedasticity conditions are used for study of the shock of a variable. ARCH and GARCH models were used in the experimental work very popularly because by using these models, the variance of a set of data at any given point of time can be estimated.

One of the assumptions of classical linear models is the homogeneous variance; i. e., the conditional variance of disruption clauses is constant. In general, it is assumed that violation the assumption of homogeneous variance will occur in cross-sectional data. But people like Angle, in their studies, have found evidences based on the fact that the disruption clauses variance in time series models enjoy less stable than what was previously assumed. In some models, under such circumstances, autoregressive conditional heteroskedasticity model (ARCH) and Generalized autoregressive conditional heteroskedasticity (GARCH) have been proposed as alternatives to the usual time series processes.

In a GARCH model, for example the GARCH (1,1) model, conditional variance equation is as distribution variable as well as previous yields squares (q) and sum of lag p from itself, i. e., It is expressed as an ARMA process.

\[ \varepsilon_t = \sqrt{h_t} + z_t, z_t \approx N(0,1) \]

\[ h_t = a_0 + \sum_{i=1}^{q} a_i \varepsilon_{t-i}^2 + \sum_{j=1}^{p} \beta_j h_{t-j}^2, t = 1,2,3,..... \]

Where \( h_t \) is the conditional variance \( \varepsilon_t \) (by conditions, it means the available information at time t) \( h_t \) is positive for each t, if we have:

\[ a_0 > 0 \]

\[ a_i \geq 0 \quad i=1,2,.....q \]

\[ \beta_j \geq 0 \quad j=1,2,.....q \]

After reviewing the liquidity shock in the research using GHARCH model and obtaining the time series of the variable, effects of these shocks on coin prices was investigated using
ARIMA models by Micro fit application for the period 1981-2009. Data was gathered from various publications and the Central Bank to estimate self-explanation with wide lag model (p, q1, ..., p2) ARDL proposed by the Sons and Sons (1997) and Sons and Shin (1998) as follows.

\[
\alpha(L, p)y_t = \alpha_0 + \sum_{i=1}^{k} \beta_i (L, q_i)x_{it} + u_i \quad i=1,2,\ldots,k1
\]

where L is lag factor, \( \alpha_0 \) is wide-intercept and \( y_i \) is dependent variable. For L which is the lag factor, we can write:

\[
L^j y_t = y_{t-j}
\]

So we can write:

\[
\alpha(L, p) = 1 - \alpha_1 L - \ldots - \alpha_p L^p
\]

\[
\beta_i (L, q_i) = \beta_{i0} + \beta_{i1} L + \beta_{i2} L^2 + \ldots + (\beta_{iq_i} L^{q_i})
\]

To use the ARDL approach, firstly, the existence of long-term relationship between the under-study variables and in other words, co-integration between the variables can be done using two methods. In the first method, co-integration between the variables can be studied with F-statistic proposed by Sons et al (1996). They calculated appropriate critical values corresponding to the number of regressions and whether the model includes wide-interceptor not and offered two critical values: One is based on the fact that all the variables are stable and all others are instable. If the calculated F is outside the boundary, an absolute decision may be taken without knowing the variables are I (0) or I (1). If calculated F is beyond the upper limit, the null hypothesis based on the lack of long term relationship is rejected and if it is less than the lower limit, the null hypothesis based on the lack of a long accepted (Tashkini, 2005, 145).

Another statistic that can be studied using the co-integration between the variables is the t-statistic proposed by Benraji, Dolado and Master. First, equation (3) is estimated using OLS for all possible combinations of values \( p = 0,1,2, \ldots, m \) and \( i = 1,2,\ldots, k, q_i = 0,1,2,0, \) m, i.e. for \((m +1)^{k+1}\) times. The maximum number of mlags is determined by the researcher and estimation of the time range \( t = n \), is done \( m +1 \). This allows the researcher to choose one of the \((m +1)^{k+1}\) regression, according to the four criteria of Akaike (AIC), Schwartz Bayesian (SBC) Henan Quinn (HQC) or \( R^2\). In Micro fit, selection is done by software. Null hypothesis indicates a lack of integration or long-term relationship, since condition that the short-term dynamism relationships tend to long-term equilibrium, is that the sum of the coefficients is less than one. To perform this test, one is deducted from the sum with lag dependent variable and is divided by the sum of mentioned coefficients standard deviation. If the obtained absolute value of \( t \) is greater than the absolute critical values proposed by Benraji, Dolado and Master (1992), the null hypothesis is rejected and the existence of a long term relationship is accepted that the second method is used for examining the long-term
relationship (Tashkini, 2005, 146). Then, coefficients related to the long-term model and standard errors of the long-term coefficients are selected and calculated according to ARDL model. ARDL method Analysis is based on interpretation of the three principles called dynamic, long-term and error correction (Nofarasti, 1999,96).

Finding and Discussions

One of the simplest possible methods for the analysis of monetary shocks is using generalized autoregressive model under heteroskedasticity (GARCH). The used variable is liquidity which has been used by the Central Bank and Statistics for a series of time since the 1981-2011. ARCH LM test should be performed prior to model estimation, which implies the existence of ARCH (heteroskedasticity) effects. The null hypothesis being tested includes the same remainder variances that according to test results based on the F-statistic which is equal to 3.64, the null hypothesis was rejected and H1 stating that there is Heteroskedasticity in the remainders is accepted. In the next stage and after accepting existence of Heteroskedasticity, fluctuation arising from Heteroskedasticity may be modeled in the data. GHRCH model consists of two self-explanatory components of conditional variance remainders, both of which appear in the model with lags. These optimal lags are times of the model. For this purpose, Akaike and Schwarz bayesian statistics were used as criteria, and RCHGA (1,1) was chosen as the optimal model as the following relation shows:

\[ h_t^2 = 0.0009 + 0.9 \varepsilon_{t-1}^2 + 0.1 h_{t-1}^2 \]

This relation fulfills the condition required for stability of GARCH model in accordance with its theoretical basis. Because as the above relation shows the necessary condition for GARCH model to be poorly stable is that the sum of model’s coefficients is smaller than and equal with 1. The sufficient condition is that the y-intercept and conditional variance coefficient of disruption clause are positive (Golstone, 1994), and the above relation meets such a condition. Changes of time series of monetary shock are fixed and positive; in other words, it can be concluded that such time series has a linear function. After examining and estimating liquidity shock, the effect of liquidity shock on the price of coin was examined using ARDL model. The variables used in this study include:

L precision=logarithm of coin price, M shock=monetary shock, Ltr=logarithm of oil revenue, Lr=logarithm of foreign exchange rate and Lp gold world=logarithm of gold world price. The data as to variables used in this study were collected from the central bank and the central statistical magazine in the form of time series within the years 1981-2009.

Taking into account the variables being in the form of time series, first, the stability of the variables was tested using Dickey-Fuller method. The results indicated that the variables used in the above model were stable at surface except for the coin variable which became stable through one time of difference making. The long-term relationship of the variables was examined using t-test in order to make sure of the existence of a long-term relationship among variables. After estimating the dynamic equation, an equation was formed in which the dependent variable with lag is displayed in table 1. According to the result of the test, t was 4.35, and because it is greater than the corresponding t equal with 4.25 in Benraji, Dolado and
Master’s table in terms of absolute value, at 95% level of confidence, $H_0$ stating non-existence of long-term relationship was rejected and its existence was accepted. In accordance with table 1, the degree determined in this study is (1,0,2,1,0).

**Table 1- Dynamic Results (Dependent Variable-Price of Coin)**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENTS</th>
<th>STANDARD ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPRICECION</td>
<td>0.39</td>
<td>0.14</td>
</tr>
<tr>
<td>MSHOK</td>
<td>5.6</td>
<td>3.01</td>
</tr>
<tr>
<td>LR</td>
<td>-0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>LR (-1)</td>
<td>-0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>LR (-2)</td>
<td>0.18</td>
<td>0.05</td>
</tr>
<tr>
<td>LTR</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>LTR (-1)</td>
<td>0.12</td>
<td>0.07</td>
</tr>
<tr>
<td>LPGOLDWORLD</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>C</td>
<td>6.8</td>
<td>1.5</td>
</tr>
<tr>
<td>T</td>
<td>0.09</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Source: Results of the Study

After proving the existence of a long term relationship among the variables of the model, the long-term relationship was estimated whose results are displayed in table 2.

**Table 2: Results of Long-Term Estimation**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENTS</th>
<th>STANDARD ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSHOK</td>
<td>8.38</td>
<td>3.59</td>
</tr>
<tr>
<td>LR</td>
<td>-0.48</td>
<td>0.16</td>
</tr>
<tr>
<td>LTR</td>
<td>0.40</td>
<td>0.16</td>
</tr>
<tr>
<td>LPGOLDWORLD</td>
<td>0.12</td>
<td>0.05</td>
</tr>
<tr>
<td>C</td>
<td>11.2</td>
<td>1.2</td>
</tr>
<tr>
<td>T</td>
<td>0.14</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: Results of the Study

As table 2 shows, the long-term changes of LR, LTR and M shock affected the price of coin. There was a positive relationship between monetary shocks and price of coin, i.e. upon occurrence of positive monetary shock, the price of coin will be adjusted upward. Rate of foreign exchange had a significant and adverse effect on the price of coin, because decrease in value of dollar is the most important factor in increase of gold value. As the value of dollar decreases, a great amount of money is entered into commodity markets from the sale and purchase market, which are transacted in the stock exchange. One of these markets is the gold market in which much money is entered. On the other side, decrease in the value of dollar will lead to decrease in foreign exchange reserve of the central bank, and the central bank will seek to increase its gold reserve in order to compensate for foreign exchange reserve, and this will result in increase of gold and coin price. Therefore, central banks act like investors and substitute dollar with gold in order to avoid decrease in their assets. There was a significant positive relationship between oil revenue and coin price, i.e. by increase in government
revenue arising from increase in oil revenue, there will be a great demand for gold in order to invest such revenue, and this will result in increase in coin price. There was a direct significant relationship between fluctuations of gold world price and coin price in Iran. Gold and coin price in Iran is affected by world gold price in a way that by increasing world gold price, gold and coin price will increase in Iran and vice versa.

For the purpose of determining the percentage of short-term imbalances in trade which is adjusted to long-term balances, ECM model was used. ECM indicates what percentage of short-term imbalances of coin price is adjusted to reach a long-term balance. The error correction coefficient in short-term is 0.6; in other words, in each period, 60% of imbalances of coin price are adjusted and get close to its long-term process. The results of estimating error correction model are displayed in table 3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMSHOK</td>
<td>5.6</td>
<td>3.01</td>
</tr>
<tr>
<td>DLR</td>
<td>-0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>DLR(-1)</td>
<td>-0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>DLTR</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>DLPGOLDWORLD</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>DC</td>
<td>6.8</td>
<td>1.5</td>
</tr>
<tr>
<td>DT</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>ECM</td>
<td>-0.6</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Source: Results of the Study

In short term, the effect of monetary shock on coin price is positive and significant. If there is an unpredictable positive monetary shock to the economy and money volume increases in the economy, investors will react to such unreliability in economy; as a result, the amount of investment will decrease, and investors will tend to save their immovable assets such as coin. The results of the study indicated that price of coin is affected by oil revenue, monetary shock, world price and foreign exchange rate. Increase of liquidity and inflation are from among the most important factors increasing price of coin in Iran. By inhibiting inflation through mild decrease in rate of money supply, people will tend to keep and save money in financial markets, and as a result, investment will increase in economic sectors, and this, in turn, will improve employment. Establishing a precious metals stock inside the country may also avoid crisis and price shocks in coin and gold transactions.
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