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The Impact of Macroeconomic Variables on Gold Prices in Iran between 1370 to 1390 (1971-2009)

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ABSTRACT

The present study examines the impact of macroeconomic variables on gold price. Data used for research and data about each of the variables extracted from quarterly time series of central banks of Iran, economic indicators and stock market indicators for the period (1390-1370). To investigate the factors affecting the gold price, a short term model is extracted and to derive estimates of long-run relationship, ARDL method and the error correction equation have been investigated. At the ends, tests of the structural stability of the demand function are examined. The results indicate that:
1. Gold price index in the previous period causes an increase in gold price in current period; 2. Rising of oil price reduces gold price; 3. Bank interest rate has a negative impact on the gold price; 4. Increase in exchange rate lowers the gold price; 5. Inflation index increases gold price.

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INTRODUCTION

In Iranian households' culture, gold always has been considered as good as a financial backing. The reason is related to high liquidity and intrinsic value of the gold**.** As we know, gold is considered an asset among households and review and identification of the variables influencing the price of assets and the extent of the impact of identified factors could contribute to the manner of policy reaction to control these assets and clear vision of the future of this property. On the other hand, governments with managing planning and policy making are always trying to find solutions for the management of the price of these assets which are important and essential items in the basket of household assets. Exchange, gold coins, stocks, dwelling can be chose as asset according to the concept of future economic benefits, and effective factors on these assets should be examined and identified to measure the effectiveness rate of these factors on any of these assets.

Gold along with oil is regarded strategic products in international markets. Meanwhile gold due to the inherent value, its resistance against decay, public acceptability, its liquidity, and low maintenance cost is highly important as far as gold is the most advanced commodity money in different communities and one of the main resources of all exchanges. In this regard, governments in the time of economic downturn resort expansionary fiscal and monetary policies to achieve economic stability or exit the recession, these policies in addition to the real sectors of the economy influence the value of the currency against foreign currencies and that is why it can be said to adopt such a policies, which influence changes of currency value of countries, affect gold and oil price.

The gold price like every other commodity is influenced by demand and supply forces in the market. However, given gold is a very sensitive and strategic goods, many factors affect its demand and supply and therefore price. The most important factors (in addition to factors affecting the cost of production), include changes of dollar price and foreign currency reserves, changes in interest rates, global inflation, changes in the global price of oil.

In recent years, economic indicators show a high fluctuation in gold price in Iran. Thus, research needs to be done to examine effects of these macroeconomic variables in gold price. This kind of research helps families manage their assets and economic policy makers to regulate macroeconomic policies. Therefore, the main research question is: How do changes in macroeconomic variables affect the price of gold in Iran?

Hypotheses:

Macroeconomic variables have a significant role in explaining the changes in gold prices.
Changes in macroeconomic variables have a significant effect on the gold price.

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The introduction of the model:

A model can never fully accurate description of reality (how it is). Complex model which has no scientific value should not be provided to describe the reality. Simplification and analysis of models is essential to obtain reasonable results. In this regard, the principle of "minimalistic of explanatory variables" ruled that a model can be considered as simple as possible. On the other hand, for preventing errors caused by removal of important variables and entrance of unnecessary variables, it is necessary to enter key and important variables based on the theoretical framework and analysis in the model. All the random effects but model components (Ut) should be omitted.

The gold price like every other commodity is influenced by demand and supply forces in the market. However, given that gold is a very sensitive and strategic goods, many factors affect its demand and supply and therefore price. The most important factors (in addition to factors affecting the cost of production), includes changes of dollar price, changes in interest rates, global inflation, changes in the global price of oil and global gold price. To investigate the relationship between economic variables on stock price index according to proposed theoretical grounds, examined model in long-term is specified as follows:

$$LPG = \beta_1 LOIL + \beta_2 LIR + \beta_3 LER + \beta_4 CPI + \beta_5 LPGW + C$$

In which:

LPG : Logarithm of gold price

$LOIL$: Logarithm of oil price

LIR : Logarithm of interest rate

LER : Logarithm of exchange price

CPI : Logarithm of prices index

$LPGW$: Logarithm of global price of gold

Methodology:

First, short-term model is estimated to investigate the factors influencing assets price. Then the error correction equation and ARDL method are used to derive the long-run relationship. At the end of this chapter, the tests related to the structural stability of the demand function are examined.

3. Results:

Initial stability test results show that research variables are not all stable I(0); therefore, the auto regressive distributed lag (ARDL) approach is used for analysis. Usually the lag in the annual details entered one or two and for the data with a higher frequency (such as quarterly and monthly data) the length of the lag can be greater, which this selection is done as researchers determine. After selecting the maximum lag, with selection of Schwarz-Bayesian criterion, the optimal logs are determined. Usually in samples less than 100, the Schwarz-Bayesian criterion is used to prevent losing too many degrees of freedom.

Short-term estimates of model of factors affecting the gold price:

Model is estimated using Microfit 4.1 software entering seasonal data of Iran from 1990 to 2010, the statistic for Schwartz-Bayesian in logs 1, 2 and 3 is illustrated in Table 1.

Table 1: Schwartz-Bayesian statistic.

Log	1	2	3
Schwartz-Bayesian statistic	70.0761	73.8309	72.713

Sources: Research findings

Thus if model's maximum log equals 2, we can summarize the results of this model in Table 2 below:

Table 2: The results of short-term ARDL coefficients (2,0,0,2,0).

Variables	Coefficients	Standard Deviation	Statistics T	Significance
LPG(-1)	0.348	0.115	3.01	0.004
LPG(-2)	0.162	0.117	1.388	0.040
LOIL	-0.801	0.206	-3.876	0.000
LSR	-0.204	0.801	-0.254	0.000
LER	-0.57	0.658	-0.356	0.003
LCPI	1.44	2.032	0.711	0.029
LCPI(-1)	1.28	2.839	0.979	0.031
LCPI(-2)	0.908	1.979	2.075	0.042
LPGW	0.065	0.083	0.777	0.039
C	3.139	2.2951	1.367	0.176

Sources: Research findings

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In the above Table:

LPG : Logarithm of gold price

$LOIL$: Logarithm of oil price

LIR : Logarithm of interest rate

LER : Logarithm of exchange price

LCPI: logarithm of prices index (Inflation rate)

$LPGW$: Logarithm of global price of gold

Short-term results of model:

Resulted model will be as follows

1-4

$$\mathrm{LPG} = \mathrm{C} + \beta_1 \mathrm{LPG}(-1) + \beta_2 \mathrm{LPG}(-2) + \beta_3 \mathrm{LOIL} + \beta_4 \mathrm{LSR} + \beta_5 \mathrm{LER} + \beta_6 \mathrm{LCPI} + \beta_7 \mathrm{LCPI}(-1) + \beta_8 \mathrm{LCPI}(-2) + \beta_9 \mathrm{LPGW}$$

According to equation 1-4, we observe that the dependent variable(*LPG)* and the variable of prices index*(LCPI)*is appeared with two logs. Now, if the obtained coefficients derived from software in the above model (4.1) to replace. Then

4.2

$$\mathrm{LPG} = 3.139 + 0.348\mathrm{LPG}(-1) + 0.162\mathrm{LPG}(-2) - 0.801\mathrm{LOIL}0.204\mathrm{LSR} - 0.58\mathrm{LER} + 1.44\mathrm{LCPI} + 1.28\mathrm{LCPI}(-1) + 0.908\mathrm{LCPI}(-2) + 0.065\mathrm{LPGW}$$

Also to test the significance of regression coefficients, we can write the following hypothesis test for the coefficients:

$$H_0: \beta_i = 0$$
$$\mathrm{H}_1: \beta_i \neq 0$$

According to table 2.4, the significance level obtained for the coefficients of all variables is smaller than significance levels of the study (a=0.05),Thus, according to the test data and the regression coefficients in Table 2.4, we conclude that H_0 hypothesis is rejected and H_1 hypothesis i.e. $\beta_i \neq 0$ is confirmed.

Discussion of short-term model results:

For interpretation of the short-term model results according to the relevant coefficients $\beta_8 \ldots., \beta_2, \beta_1$and Coefficients of the regression model shown in Table 2, the following results can be concluded:

A. Coefficient $\mathrm{LPG}(-1)$ i.e. β_1 is positive and statistically significant. That means gold price index in previous period increases gold price in this period.

B. Coefficient $\mathrm{LPG}(-2)$ is also positive and statistically significant. That means gold price index in two previous periods increases gold price in this period.

C. Coefficient LOIL i.e. β_3 is statistically significant as It shows negative effect of oil price on gold price.

D. We observe coefficient LSRi.e. β_4 is negative and statistically significant. This significance indicates that bank interests rate has a negative effect on gold price.

E. Coefficient $\mathrm{LER}$is negative and statistically significant. That means increase of exchange rate decreases gold price.

F. CoefficientsLCPI, $\mathrm{LCPI}(-1)$ and are positive and statistically significant. That means present, previous period and the other period prices index (inflation rate) increases gold price in this period.

G. Coefficient LPGW is also positive and statistically significant. That means global gold price index increases gold price in Iran.

Long-term estimate of model:

Now we describe long-term estimate. The result of long-term model estimate is presented as follows. Long-term model can be written as follows:

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4.3 $LPG = C + \beta_1 LOIL + \beta_2 LSR + \beta_3 LER + \beta_4 CPI + \beta_5 LPGW$

Now according to long-term coefficient and inserting in equation 4.3 we have:

4.4 $LPG = 3.85 - 0.98 LOIL - 0.25 LSR - 0.67 LER + 0.14 CPI + 0.079 LPGW$

Table 3: The results of long-term model estimate ARDL(2,0,0,2,0).

Variables	Coefficients	Standard Deviation	T Statistic	Significance Level
LOIL	-0.98	0.205	-4.783	0.000
LSR	-0.25	0.993	-0.252	0.001
LER	-0.67	0.758	-0.456	0.009
LCPI	0.14	0.330	0.442	0.039
LPGW	0.079	0.103	0.770	0.044
C	3.85	2.827	1.36	0.177

Sources: Research findings

Analysis of gold price long-term model results:

For interpretation of long-term model results according to regression coefficient $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 relared to equation (4.4) and relevant coefficient following results can be obtained:

a) the negative mark of $\beta_1$coefficient related to variable LOIL of model indicates that in long term a one unit change in oil price will cause a 0.98 unit reduction in gold price.

b) Bank interest rate coefficient (i.e. β_2)in long term is negative. In fact, a one unit change in this variable will cause a 0.25 unit reduction in gold price. It can be claimed that increase of bank interest rate lead assets toward bank system and this cases reduction of gold demand and as a result its price reduction.

c) Exchange rate coefficient i.e. β_3 has a negative effect on gold price in long term. A one unit increase in exchange rate will cause a 0.67 unit reduction in gold price.

d) Prices index (Inflation rate) coefficient i.e. β_4 has a positive effect on gold price in long term. This analysis is evidenced because a one unit increase in this variable will cause a 0.14 unit increase in gold price.

e) Global price of gold coefficient i.e. β_5 is positive which indicates in long term a one unit increase in global price of gold will cause a 0.079 unit increase in gold price.

Error correction model estimate:

Now we discuss the estimates of error correction pattern which indicate short-term relation between dependent variables and independent variables. Its related coefficients are shown in table 4.

Table 4: The results of error correction model.

Variables	Model coefficients	Standard Deviation	T statistic	Significance level
dLPG1	0.162	0.117	1.387	0.040
dLOIL	0.801	0.206	3.876	0.000
dLSR	-0.204	0.801	-0.254	0.000
dLCPI	1.44	2.034	0.711	0.079
dLCPI1	1.10	1.979	2.075	0.042
dLPGW	0.065	0.083	0.777	0.039
dC	3.13	2.295	1.367	0.176
ECM (-1)	-0.814	0.137	-5.906	0.000

Sources: Research findings

As we can observe in table 4, EMC Coefficient is negative and significant, i.e. -0.814. Thus, as this coefficient is significant and between 0 and -1, there is a co-integrative relation equal to -0.814. we conclude that approximately 81 percent of created imbalance in the dependent variable in each period, from its long-term balance quantities in a period, is adjusted and disappears in next period. In other words, if any shock or imbalance occurs in financial development, after a time less than one year and a half again it returns to balance. Consequently, there is a suitable movement toward balance.

4. Discussion:

In long term, a one unit change in oil price will cause a 0.98 unit reduction in gold price. price increases, more dollars is needed for oil trade. United States finances this rising cost with printing dollar. Increase of the

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size and supply of dollars in the international market cause reduction of the value and purchasing power of dollar, these set of factors causes that governments tend to have assets such as gold, because gold has feature of maintaining the value of property and people enjoy less risk with its saving rather than the dollar whose price is coming down.

Bank interest rate coefficient in long term is negative. In fact, a one unit change in this variable will cause a 0.25 unit reduction in gold price. When bank interest rate reduces, people have no desire to save their cash deposit including dollar, therefore with reduction of desire for keeping dollar, since gold has value stability even in conditions of war, crisis and international tension, people tend to purchase it which this itself increases the gold price.

Exchange rate coefficient has a negative effect on gold price in long term. This variable has a reverse effect. A one unit increase in exchange rate will cause a 0.67 unit reduction in gold price. Decline in the dollar leads to a decrease in central bank reserve of different countries and they compensate this by increasing their gold reserves that end in the cash flow growth in the gold market and increase of gold price.

Prices index (Inflation rate) coefficient has a positive effect on gold price in long term. This analysis is evidenced because a one unit increase in this variable will cause a 0.14 unit increase in gold price.

Global price of gold coefficient is positive which indicates in long term a one unit increase in global price of gold will cause a 0.079 unit increase in gold price.

5. Conclusion:

In long term, a one unit change in oil price will cause a 0.98 unit reduction in gold price. When oil price increases, more dollars is needed for oil trade. United States finances this rising cost with printing dollar. Increase of the size and supply of dollars in the international market cause reduction of the value and purchasing power of dollar, these set of factors causes that governments tend to have assets such as gold, because gold has feature of maintaining the value of property and people enjoy less risk with its saving rather than the dollar whose price is coming down.

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