The Impact of Monetary Variables on Economic Growth in Iran: A Monetarists' Approach

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Abstract: There is a dispute among economists about the impact of monetary variables on real variables. Some believe that the change in money volume affects only the nominal production and it does not have any effect on real variables of economy such as real employment, real production and real economic growth. The others claim that the monetary variables can also influence the real ones in short run and even long run and they escalate the economic growth, as there is monetary misgiving in economic factors. The current research investigates different economic theories in this realm and tests them by applying the existing information and statistics. This is an analytical and empirical research because it analyses events by experimental observations in several statistical models. This paper scrutinizes neutrality or non-neutrality of the money during the period 1959 to 2008 in Iran with a monetarists' approach. Findings show that there is no significant relationship between the money volume and real economic variables, production and employment and monetary policies are neutral in Iran. The gross domestic product in Iran does not fluctuate intensively except in recent years and it has a normal direction. However, the unemployment rate fluctuates largely which is not natural.

Key words: Monetary policy · Neutrality of money · Real variables · Monetary variables · Monetarists' approach

INTRODUCTION

Monetary variables include those measured based on current prices such as nominal production, nominal interest rate, nominal investment, nominal consumption, nominal money supply, government expenses and oil revenues. The impact of monetary policies on real variables of economy such as economic growth has been the subject of dispute between Classics and Keynesians. Theorists in these schools use real evidences and some economic models to support their own theories. Since there are fluctuations and changes in monetary policies in Iran, it seems also possible to examine this phenomenon in the economy because understanding the effects of such policies on the economic growth during the mentioned years is critical for maximizing the monetary policies in future. This paper aims to measure the impacts of monetary variables on economic growth. Accordingly, it seeks to answer the following questions:

- Is there any significant relationship between the implemented monetary policies and total demand of economy?
- Do real variables of the economy such as domestic national production and unemployment follow a dependent path?

The neutrality and non-neutrality of money and the way it enters the economic arteries is a controversial subject in monetary economy and there are various economic attitudes in this field. Investigating the neutrality of money is important because it is a significant mean in the hands of monetary authorities for removing the recessionary (shortage of demand) and inflationary (excess of demand) gaps of using monetary policies. Thus, it is needed to ensure the effectiveness of monetary policies and then implement them. If the money is neutral, the monetary policies will be ineffective and will vary along with the increase in prices. Therefore, in the case of

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money neutrality it is required to avoid implementation of monetary policies and in the case of non-neutrality it can be used to provoke real variables such as production and employment. Thus, the motive for this study is testing neutrality of monetary policies to show whether policy makers should use other policies for economic growth. There are different views about the way money enters the economic arteries; as such, some consider the money as an active variable and they think its control is possible consequently. Nonetheless, the others consider money as a passive variable believing that specific economic conditions impress money passively. So, it is needed to influence those economic fields, conditions and mechanisms causing monetary expansion or limits. Those who consider money as active investigate the problem solving of monetary variables in active control of the money. The others emphasize on passive money changes since they believe money is passive.

Money is demanded and supplied like any other products and the law of demand and supply applies to it as well. Thus, if we consider interest rate as the money price, we can call the investment as demand for cash. So, money demand is inversely related to the interest rate. We can consider saving as cash supply and we can assume investment as demand for cash which is related to the interest rate directly.

Sidrauski enters money in the utility function and believes that tracking money flow in economy and specifying the nature of Kelawar limitation for any kinds of transactions can get complicated [1]. This leaded to usage of money in production function or utility function directly. In Sidrauski's model money cannot influence real variables of economy in long run. Retention of money is favorable itself. Assets comprise capital and money. In one side, money retention is useful and in the other side it is not so, given that it reduces the individual's ability to accumulate capital in the next period. Individuals who aim to maximize their utility and firms try to maximize their profits [1].

Ramzi has also expanded both consumption and real monetary balances to be considered in utility function. Based on Ramzi's notion, money is also influential in production utility as capital is influential in production. It means that money is one of the production factors [1]. In this case, money needs to be changed along with other production factors. Otherwise, it is not influential on real variables such as production and employment [2]. Based on Keynes, money in national economy is a fundamental variable whose change in given situations can considerably impress the production and unemployment

level through the interest rate [3]. He believes that monetary changes influence the interest rate. The change in interest rate changes the amount of investment adversely which influences the effective demand, production volume and employment level consequently.

[4] put great importance on monetary policies and believes that the money volume should change according to the changes in real productions. He does not accept Keynes's analysis on inefficiency of monetary policies and the indirect and doubtful effect of money volume changes on effective demand. He also believes that money effect is direct. Increase in money volume leads to excess of demand for real inventories which ultimately increase the monetary income [4]. The main question is whether the increase in money volume escalates only the prices or the production. Answering this question depends on the employment level and the existing production capacity.

Monetarists Mention Three Characteristics for Money:

- They emphasize self balancing of the economy in long run.
- They believe that money volume is an important factor determining the amount of monetary (nominal) national gross production.
- They have an interventionist attitude towards the macroeconomic policies tracing back classic economy, Ricardo and Adam Smith's school [5].

In Monetarists' opinion, money is determinant of monetary gross national production. They believe that money volume is the main factor in determining the economic activities level measured in the current price and this is money which determines the monetary gross national production.

They also believe that central banks should create a stable growth in money supply because it will lead to stable growth in economic activities due to the close relationship between money supply and monetary income.

[6] presented the views of different schools about money as displayed in Table 1.

In macroeconomics, Classical dichotomy is related to classical opinions and Pre-Keynesian economy in which he nominal and real variables were analyzed. Classical dichotomy means that the variables such as real product and real interest rate can be analyzed thoroughly regardless of what happens to nominal variables like the product monetary value and the interest rate providing that they are real. Particularly, this means that real GDP

Table 1: Views of different schools about money effectiveness [6]

View	School
Money is neutral and affects only the nominal sector of the economy	Classics
Money is not neutral but there are lots of barriers such as liquidity trap against its effectiveness	Keynesians
Money is not neutral in short run but it is neutral in long run	Monetarists
Unpredicted monetary policies affect the production level and other real variables only in short run.	New Classics
Money is neutral and affects only the nominal sector of economy	Real Business Cycles
Money is not neutral and monetary policies are effective.	New Keynesians

and other real variables can be determined regardless of knowing nominal level of money and inflation. If money is neutral and merely influences the price level without any effects on real variables, a Classical Dichotomy is then considered. Post-Keynesian economy was established by Michal Kalecki, Joan Robinson, Nicholas Kaldor and Paul Davidson based on the general theory of Keynes. Lord Skidelsky, the author of Keynes's biography, stated that the Post-Keynesians completed the Keynes's work in rejection of money neutrality. Post-Keynesians believe that the money is not neutral. Hence, it is viewed as an important and basic factor in economy based on their opinions.

The previous researches done in this field will be presented in the second part. The third part will present the results of the estimated model. Hypothesis testing and conclusions will be shown in the fourth and fifth parts. Finally, practical recommendations will be dealt with in the last part of the paper.

Literature Review: [7], in a study on economy of the United States of America, investigated the money neutrality in a systemic way by applying Seemingly Unrelated Regression (SUR). The results revealed that the monetary policies are neutral and involve real effects. [8] studied the India's economy by data gained through 29 years. He applied the HEGY technique and seasonal accumulation test and showed that money is hyper neutral in India's economy.

[9] researched the Neoclassic' money neutrality assumption in Turkey using the seasonal data during the period 1995 to 1980 and applied a self regressive model with five variables including the real production, money volume, government expenses, exchange rate and general level of prices for analysis. Unpredicted element of money does not influence the real production level but its predicted element has a significant effect on real production. Also, results proved that both predicted and unpredicted elements of monetary policies (government expenses) have significant effects on real economic activities.

[6] investigated the effects of monetary and fiscal policies on real and nominal variables in Iran's economy based on the analysis during the period 1959 to 2004 applying the Seemingly Unrelated Regression (SUR). Results confirmed that implementing monetary and fiscal policies in Iran's economy cannot influence the real variables. So, their main effects are on nominal sector of economy or the price levels. Since monetary and fiscal policies are not able to considerably influence the production changes, it is better to use these policies in relation to anti-inflationary objectives.

[10] tested the Barrow's theory about money neutrality in Iran's economy. They found that the increase in money volume and liquidity does not help production growth and causes inflationary pressures.

Investigating the interaction between the monetary and real sectors in Iran's economy through Distributed Lag Model, [11] found that production in Iran's economy was an exogenous variable and money volume played no role in production fluctuations.

[12] studied the money neutrality in Iran's economy during the period 1959 to 2002 by using Fisher and Siter's method. Findings indicate that money in Iran's economy is neutral but hyper neutrality of money is acceptable during the study period.

[13] investigated the money neutrality through the separation of money to two internal and external elements by applying seasonal convergence and Hegi's test. Results showed that the internal and external money explain a trivial percentage of production changes in long run and the effects of these two variables on production are equal and reverse. Also, it is the equality and symmetry of two internal and external elements of money that lead to money neutrality in long run.

[14], using regression method, answered to the question whether the positive and negative monetary impulses have symmetrical effects on production or not. They believe that Neoclassic' models assume the existence of symmetry whereas the asymmetry of monetary impulses on production is predicted in Neo-

Keynesians' models. Their findings reject this hypothesis that positive and negative monetary impulses have equal and opposite effects on the economic growth rate.

A review on researches done in Iran's economy shows that the government often faces with budget deficit by decreasing in foreign exchange revenues from oil export which has financed through borrowing from central bank. Severe positive monetary impulses in recent years have occurred when Iran's economy had an appropriate income status due to the increase in oil revenues. Nevertheless, it has faced with stagnation and recession which can be considered as one of the reasons of ineffectiveness of positive monetary impulses on the economic growth. Thus, more coordination will be effective in applying monetary and fiscal policies.

[15] investigated the interactions of nominal and real variables in demand and supply. Results showed that the supply impulses are highly important in Iran's economy fluctuations.

[6] assessed the role of factors affecting money demand in Iran's economy using accumulation analysis and "Self-regressive with Distributed Lag Model" and applying time series statistics during a 42-year period. Their findings indicated the existence of a long term equilibrium relation between real money demand and macroeconomic variables such as real GDP and nominal profit rate and inflation rate leading to approving the consistency of money demand function in Iran's economy.

In most researches done in Iran, there is no significant relationship between money volume and real GDP. The above study confirms the relationship between money demand and real GDP and rejects the relationship between the money supply (volume) and real GDP confirming the money neutrality again.

[17], using self regressive method with distribution lags, showed that appropriate adoption of monetary and fiscal policies in the economy of any country is subject to the type of money demand function in that country. Based on their opinion, it is essential to know this function and main variables affecting the money demand in Iran's economy during 1959 to 2004. Results indicated that variables of real balance of money, GDP, inflation rate and budget deficit were convergent.

[18] stated that consistency in money demand is the most important problem and in fact it is the prerequisite of any monetary policy. Using a simple summation for money definition is inconsistent with micro economic theories because it is assumed implicitly that the consumer considers the elements of money demand complementary. There is a group of numerical indices in the theory of calculating economic indices which are useful for summing items with different levels. One of the best indices is Divisia Index. Optimum money demand was made in their research by Divisia Index for seasonal data from 1988 to 2004. Then, money demand function was estimated based on it.

[19], by applying Cobb Douglas estimation method, found that using transient oil resource in Iran's economy cannot be reliable in long term economic development. Results showed that oil revenues should be invested instead of consumption if Iran intends to develop the trade in the international economy. In this case, spending oil revenues in private investment brings about more productivity compared to the time when they are spent by the government. It means that the government should encourage the private sector to support domestic investors.

[20]'s findings indicated, by using utility maximization method, that the price factor role is lesser than activity level variable role and GDP minus exports in the imports demand function. This finding does not differ in short or long term. Generally, income factor affecting the imports demand function is important through activity level variable in Iran's imports demand function during the period 1952 to 1996. The results indicate this fact that the contractionary monetary policy questions the adjustment of balance of payments using the sensitivities method.

[21] stated that international specialization in a product leads to severe dependence of the country to the product export revenues. Also, its severe fluctuations will lead to fluctuation and inconsistency of export revenues due to the unpredictability of export products prices. This will have negative and sometimes positive, effect on the whole economy. Variability and price fluctuations are mainly reflected by inconsistency in national income and economic growth.

This paper differs from previous works in terms of using more data and applying two variables of exchange rate in parallel market and growth rate of oil revenues.

Results of Model Estimation

Methods: In this section, we use two methods to measure the influence of money volume on real economical variables. Firstly, we estimate the effect of real variables such as employment and real economical growth on other variables like real money volume, real growth rate of government expenses and growth rate of oil revenues and then we assess the effect of real money volume on real economical growth rate, real growth rate of government

expenses and growth rate of oil revenues. The effectiveness of monetary policies on real variables requires significant coefficients for these variables and if their signs are in line with each other, the monetary policies will have positive effect on the economy real variables.

This section experiments the neutrality and non-neutrality of monetary policies during 1959 to 2008 by applying a model adopted from [7, 9]. All econometric analyses have been done by Eviews 5 Software Package.

The real growth domestic product (RGDP) and rate of employment (RE) are the endogenous variables of the model and money volume growth (RM_1), growth rate of government revenues (RIO), parallel exchange rate (PEX) and growth rate of real government expenses (RG) are exogenous variables.

The self regressive system is estimated by SUR method and the optimum model will be selected based on information measures. According to self regressive system, it is possible to judge the neutrality and non-neutrality of monetary policies based on these equations. In other words, if coefficients of money volume variables are not significant or have negative effects on real variables, the monetary policies will be neutral.

As [7] stated that this model has advantages such as systemic equations (mutual relationships between the model variables) and is appropriate for rational expectations assumption consequently. Using an equation system, such as the model adopted in this study, involves the rational expectations assumption. Therefore, it is possible to test this assumption in addition to money neutrality testing by estimating this equation system.

The Measurement Method for Money Volume Effect on Real Economic Variables: During the period 1959 to 2008, money volume was increased from 40.3 billion Rials to 625759 billion Rials indicating 1552652 percent growth; namely the money volume had risen 15528 times in the relevant period. The figures show a high growth. Iran's economy has experienced two-digit growth rates during this period except in the years of 1960, 1961and 1984. The growth of this variable was 57% at the top in 1974 and -5.9% percent at the bottom in 1963.

The current study uses econometrics and estimation of regressions of real employment, real economic growth and real money volume.

At first, we estimate the effects of rate of employment (RE) on lag variable of growth rate of employment (RE (-1)), lag variable of money volume (RM_1 (-1)), lag variable

of growth rate of gross domestic product (RGDP), lag variable of growth rate of real government expenses (RG), lag variable of growth rate of government income (RIO) and parallel exchange rate (PEX):

$$RE = 11.004+0.9\ re\ (-1)-0.02rm1\ (-1)+006rgdp\ (-1) +0.018rg(-1)+0.002rio(-1) - 0.0001pex\ t\ (1.959)$$
$$(14.5)\ (-1.41)\ (0.128)\ (1.055)\ (0.126)\ (-02035)$$

$$(1)\ \bar{R}^2=0.92\ \ n=48\ \ h(D)=2.098\ \ F=9.037\ (1340\text{-}1387)$$

According to regression (1) there is no statistically significant relationship between real employment rate and money growth.

Now, we estimate (RGDP), (RM_1 (-1)), (RIO), (RG) and (RE):

$$RGDP = -22.78 - 0.108\ rm_1(-1) + 0.081\ rio(-1) + 0.161rg (-1) + 0.312E(-1)\ t(-0.99)\ (-1.81)\ (2.32)\ (2.194) (1.239)$$

$$(2)\ \bar{R}^2=0.34\ \ n=48\ \ h(D)=2.148\ \ F=6.9\ (1340\text{-}1387)$$

Based on regression (2) there is no statistically significant relationship between (RGDP) and money volume. Its determinant coefficient is also very low.

[22,23] have shown that if two time series are summation of an order but their linear combination are summation of lesser order, there will be long term equilibrium relationship between two series. Therefore, the current study used Dicky Fuller test to examine the reliability of variables. The results showed that all the variables were unreliable and had single root. Since the model estimated by time series variables, there would be no concern. As it can be observed, the F statistics is at a high level and the coefficients signs are accepted theoretically. But there is no significant relationship between economic growth and money growth, nor between the employment and money growth.

Durbin Watson statistics is not valid in lag models [24]. So, we use h(D) showing that there is no correlation between explanatory variables.

The data trend in this study can be extended to prior years but its extension to years after 2008 should be done cautiously.

Hypotheses Testing: The current paper considers the following hypotheses:
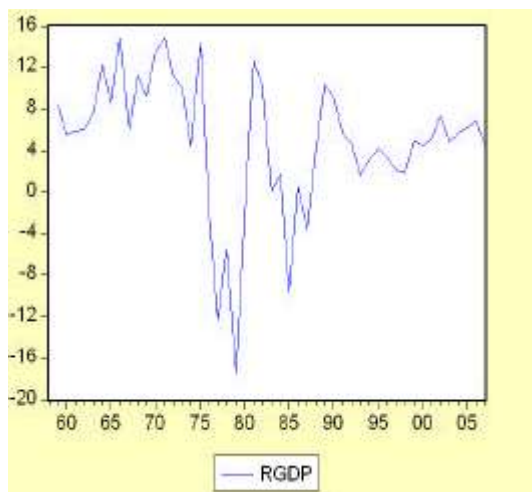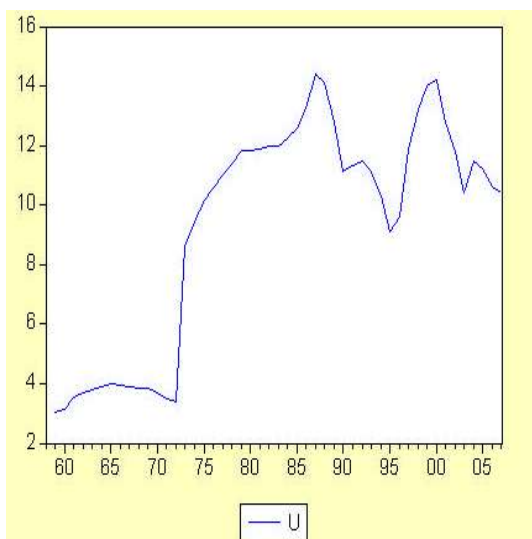
Fig. 1: Time Path of RGDP

Fig. 2: Time Path of Unemployment Rate

- The implemented monetary policies in Iran's economy have not influenced the economy total demand significantly.
- In Iran's economy, real variables such as GDP and unemployment have a Hysteresis in employment.

Answering and testing the research questions and hypotheses, we used the econometric models and Eviews 5 Software Package. As it was shown in the third part, money growth is not influential on real economic variables and real employment. So, implemented monetary policies in Iran's economy do not have significant influence on the economy total demand. Accordingly, the first

hypothesis is accepted. Testing the second hypotheses, we depict the time path diagram of RGDP and unemployment rate separately.

As it is shown in Figure 1, the real GDP have severe fluctuations and does not have a natural path.

Stability of high employment in short term can be the result of this fact that the current unemployment is influential on wage contracts and therefore, economic policies changing the real unemployment in a time will also change the unemployment rate. The unemployment rate will be consequently different in short term compared to the long term.

This model reinforces the micro principles of Keynes and states that changing real unemployment contributes to the change in the unemployment equilibrium for several periods.

As it is observed in Figure 2, there are many fluctuations in unemployment rate and it lacks the natural rate. Thus, the second hypothesis is rejected. In Iran's economy, GDP and unemployment rate do not have natural rate and fluctuate highly.

CONCLUSION AND DISCUSSION

This paper measured the relationship between real economic variables, employment and economic growth and money volume. Classics believed that the money was neutral and effective on nominal variables of economy such as prices, interest rate and nominal production. We investigated the impact of money on real economic variables by applying the monetarists' approach. They believe that money is not neutral in short term. Instead, it is neutral in long term.

We estimated the effect of real economic variables such as employment and real economic growth on other variables such as real money volume, real growth rate of government expenses and growth rate of oil revenues and exchange rate in parallel market to measure the impact of money volume on real economic variables.

The research results showed that money growth is not influential on real economic variables and employment growth. So, implemented monetary policies in Iran's economy do not have any influence on the total demand of economy approving the first hypothesis.

- The second hypothesis is rejected and can be rewritten as follows:

In Iran's economy, real GDP and unemployment rate do not have a natural rate and they fluctuate sharply.

The purpose of this research was measurement of the previous monetary policies and their effects on Iran's economy in order to optimize the policy making in future through the most effective monetary tools. The main purpose of this study was measuring the effect of money volume on economic growth. The subsidiary objectives were also followed:

- Measuring the effects of monetary policies on economic growth
- Testing the neutrality of monetary policies on Iran's economy

The empirical findings indicated the neutrality of monetary policies in Iran's economy. Thus, government and policy makers should consider this fact that, due to the neutrality of monetary policies in Iran, not only increasing money volume does not lead to economic growth but also it increases the inflation since real variables are under the influence of government supply and financial policies. It should be noted that the results confirm the other studies in Iran. Because most of the effects of monetary policies show themselves in nominal sector of economy (price levels), it is possible to use the monetary policies toward anti-inflationary objectives.

Practical Recommendations:

- Policy makers cannot use expansionary monetary policies to increase production and employment due to the neutrality of money in Iran.
- Policy makers can use contractionary monetary policies to control inflation.
- In order to change the production and employment, fiscal policies or supply policies should be used.
- Income policies and wage control in Iran also leads to stabilization of prices, production and employment. Therefore it is recommended to use such policies, too.

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APPENDIX 1

Symbols, Variables and Sources of Information

Source of Information	Variable	Symbol
1 - Rate of Unemployment	Rate of Employment	E
Paper Calculations	Degree of Accumulation	I(X)
Iran Central Bank	Income of Oil	IO
Iran Central Bank	Money Volume (Billion Rials)	M_1
Iran Central Bank	Liquidity Volume (Billion Rials)	M_2
-	Sample Size	N
Iran Central Bank	Parallel Exchange Rate	PEX
$(g-g(-1))\times100/g$	Growth Rate of Government Expenses	rg
$(gdp-gdp(-1))\times100/gdp$	Rate of economic Growth	rgdp
$(io-io(-1))\times100/o$	Growth Rate of Oil Revenues	Rio
$(m1-m1(-1))\times100/m1$	Growth Rate of Money Real Volume (%)	Rm1
$(m2-m2(-1))\times100/m2$	Growth Rate of Liquidity Real Volume (%)	Rm2
Iran Central Bank	Rate of Unemployment	U