The relationship between money supply, prices, government expenditures and economic growth in Iran economy

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Abstract

Economic growth is a quantitative index that measures countries' economic progress rate and its influencing factors are of critical importance. To achieve a high and stable growth is one of the macroeconomic policies objectives. In the present research short and long-term relationship of economic growth with money supply, inflation and government expenditures in Iranian economy were studied via the autoregressive distributed lag (ARDL) method during the years 1981-2011. It was concluded that all three variables have significant effects on economic growth.

Keywords: economic growth, money supply, government expenditures
Introduction

Today, economic growth is considered as one of the most important issues of countries all over the world. Economic growth is a quantitative index that measures countries' economic progress rate and factors influencing it are of critical importance. To achieve a high and stable growth is one of the macroeconomic policies objectives. Therefore, issues associated with growth patterns, understanding the determinants of economic growth and the response of domestic production variable to shocks emanating from the money markets, commodities and currencies are fundamental questions in theoretical and empirical literature. In this study we attempt to investigate the impact of fiscal and monetary policy tools on the economic growth. Primarily, theoretical bases are described and then according to the theoretical bases, the model and its estimation will be expressed.

Theoretical bases

During the recent decades, in order to achieve major goals such as development, growth, income distribution, financial stability, job opportunities, etc. macroeconomic literature has provided many tools on fiscal and monetary policies in almost every country. However, economists do not agree on some relevant topics in the field including issues like “weather the government expenditures affect economic growth or not?” as well as “weather appropriate contraction policy measures impact on economic development and financial stability?” From this perspective, policy makers are often concerned with demand side and supply-side policies. Money supply changes will influence liquidity of financial institutions and private expenditures of the economy. Monetary theory with the purpose of making policy is based on two main components: the quantity theory of money and the natural rate of unemployment. Monetarism is derived from the quantity theory of money and suggests that changes in money supply make major effects on short-term national production and long-term prices level as well as monetary policy objectives targets to the best rate of money supply growth. Assuming that the velocity of money is constant and production is not affected by money supply, any rising of money supply increases proportionally the level of inflation. In this area, monetarism involves particular long-term
evidences rather than short-term ones. According to the monetarism, monetary authorities change money supply. As money supply increases, the price is also proportionally increases (with the assumption of other factors are fixed); hence, as monetary authorities increase money supply, inflation increases, too. In other words, the natural rate of unemployment hypothesis suggests that the rate is set by the central institution of the national economy. Due to the any increase in money supply that causes the production level becomes higher than normal in the short term, the price level (i.e. inflation) increases proportionally during a long-term period. Some economists suggest that rather than pursuing the aim of full employment, macroeconomic policy-making should move towards achieving a constant rate of money growth. However, monetarists put aside the possibility that demand management can be effective for the economic growth or employment in a long-term period. They argued that the studied policies don't create employment opportunities; on the contrary, these policies just cause inflation in the economy. This methodology is derived from demand management and mechanisms of the free market suggesting that price stability is essential. The second feature of monetarists approach focuses on centralized economy supply. Monetarists reject any discussion on demand management policies; however, they are in agreement that the government could play an important role in promoting economic efficiency by means of macro tools and policies for influencing families and industries of the supply side. To cut the marginal tax rate for high-class income is an example of the mentioned approach. This is based on the assumption that entrepreneurs will be led to a way for long-term economic growth. In other words, incentives to reduce unemployment and payments related to receipts (i.e. wages) are provided for those with low incomes. However, in recent decades, central banks didn't predict the important role of investment banks in the global financial system. Investment banks were developed due to the funds partnership and out of the traditional regulatory framework of commercial banks.

On the other hand, an economic theory automatically doesn't make strong results about the impact of government programs on the economic performance. In fact, almost any economist believes that there are conditions in which lower levels of the government expenditures lead to the economic growth; moreover, in some other conditions higher levels of the government
expenditures is unfavorable for the economic growth. If supposedly government expenditures is zero, economic growth will be limited because it is very difficult to enforce contracts, to guarantee property rights and to develop infrastructures. In other words, some government expenditures is necessary to apply the rule of law (Mitchell, 2005 p.4). There is a debate among economists that whether the public sector should intervene to control the short-run fluctuations of an economic activity. Classical and Keynesian economists have different views on this issue. Classical economists believe that market forces direct the economy towards a long-run equilibrium through adjustments in the labor market while in Keynesian (1936) self-regulatory mechanisms are fallible since there is inflexibility in the labor market. For this reason, Keynesians offer implementation of fiscal policies for economic adjustment in periods of recession. The relationship between fiscal policy and economic growth has created a wide debate theoretically and experimentally. The relationship between public expenditures and national income is one of the important financial debates because public expenditures rate has increased over the time in almost all countries of the world.

Identification of a causal relationship between the two variables is essential for governments since public expenditures has an important role in the development of a country. This means that the increase in government expenditures with increase in national income may have positive or negative effects on the growth of a country’s national economy. The present study aims to investigate effects of money supply, inflation, government expenditures on economic growth of Iran. Previous studies relevant to this issue are presented in the following.

**Review of literature**

Many studies have been done about the effectiveness of monetary and fiscal policies on economic growth and macro variables. Using coefficient of multiplier - acceleration principle Karpetis (2006) developed a dynamic new Keynesian model in order to test quantitative impact of changes on the government expenditures level as well as the effect of nominal money supply growth rate on the level of some macro values. According to his results, inflation long-term values (expected and real) are under the influence of government expenditures rate and nominal
money supply. Demeri et al (2004) through the use of West Germany data from 1947 to 1981 realized that unexpected growth of the money impacts on production and employment. Choi and Devereux (2005) examined how the effects of fiscal policy (increase in government expenditures) through different levels of real interest rates influence an economic activity asymmetrically. They showed that effects of monetary policy depend on the level of real interest rates. They used threshold vector autoregressive model of United States data and presented evidences that if real rates are low, expansionary expenditures of the government will be more effective on short-term growth.

Han and Mulligan (2008) argued that inflation has a significant and positive relation with the size of government, mainly when compared to periods of war and peace. They found out that during peace time-series there is a weak positive correlation between inflation and the government size as well as a negative correlation between inflation and non-defense expenditures of the country. Using Thailand-related data from 1993 to 2004, Jiranyakul (2007) recognized a causal relationship between economic development and the size of government. Empirical evidences showed that there is no two-sided relationship between government expenditures and economic growth. However, there is a unidirectional causality from government expenditures to economic growth. Furthermore, estimation results of ordinary least squares (OLS) regression emphasize the positive effect of government expenditures on economic growth during the research period.

Acosta-Ormaechea and Morozumi (2013) studied re-allocation effects of public expenditure on long-term growth. They used the data from 56 countries over the period of 1970-2010 as well as GMM estimations of dynamic panel and realized that compared to current expenditures public capital expenditures are associated with higher rates of growth. Based on assumption that government expenditures rate is associated with the current oil boom rate in Azerbaijan, Koeda and Kramarenko (2008) tested a financial scenario and indicated that the evaluated financial scenario poses risks of the growth sustainability.
Gupta et al. (2005) assessed the effects of fiscal consolidation and expenditures combination on economic growth in a sample of 39 low-income countries during 1990s. Their findings showed that good state of the budget is usually associated with higher economic growth in the short and long-term periods. Combination of the public programs is important, too: The growth rate is low in countries focusing on wage-based expenditure whereas countries allocating a greater share of expenditures on capital and non-wage goods and services benefit a rapid increase in production.

Olabisi and Oloni (2012) in a study and by the use of VAR models examined the relationship between the composition of public expenditure and economic growth during the years 1960-2008 in Nigeria. Findings indicated that due to high rates of rent-seeking expenditures as well as the growing rate of unemployment, education expenditures have not led to the economic growth in the cited country. In addition, health and agricultural expenditures would help the economic growth because of the positive and effective role in growth; however, further studies are needed to experimentally determine why public expenditures on water and education are negatively associated with growth.

Georgantopoulos and Tsamis (2013) using error correction mechanism (EMC) and Johansen cointegration studied the short and long term relationship between money supply, inflation and economic growth in Cyprus. Their results showed that public expenditures promote economic development in Cyprus.

Albatel (2000), using data from 1973 to 2004 in Saudi Arabia and applying Granger causality test tested the relationship between money supply, government expenditures and economic growth. The results of his research revealed a two-sided causality between these variables. Employing a non-cumulative analysis for Nigeria during 1970 to 2008 Nurudeen and Usman (2010) examined the government expenditures on economic growth. They understand that capital expenditures of the government, current expenditures and educational expenditures impact economic growth negatively. In contrast, increase of government expenditures on transportation, communication and health increase economic growth, too. Hsieh and Lai (1994) did a time-series multivariate analysis based on the data of the Group 7 (G-7) where a special attention is
paid to the casual pattern and functions shape of the impulse response in VAR. Empirical results showed that the relationship between the government expenditures and growth could significantly change over the time. This change occurs in accordance with the economic growth rate in major industrial countries. Mehmood and Sadiq (2010) tested the short and long term relationship between fiscal deficits. Findings suggested a high expenditure of the government on tax revenues collection and decreased poverty. Their results indicated that based on Pakistan annual data (2010-1976) there is a negative relationship between government expenditures and poverty.

**Model and Estimation**

The present research aims to study the relationship between economic growth (measured by change rate of real and gross domestic product (GDP)), money supply (M), prices (measured by the consumer price index (CPI)) and the actual total government expenditure (GE). The studied data are applied annually for years 1981 to 2012, extracted from the site of Iran Central Bank. At the estimation stage, primarily variables enter into the model within a framework of error correction model (ECM). The advantage of ECM is that variables short-term volatility is linked to long-run equilibrium values. In this respect, at first stationary of the variables is needed to be tested in order that spurious regression problem to be avoided. For this purpose, Augmented Dickey Fuller single root test was used. The related results are presented in table 1.
Table 1. Stationary test results for variables of the model

<table>
<thead>
<tr>
<th>Variable</th>
<th>The model with intercept and without trend on the variables</th>
<th>The model with intercept and without trend on the first difference of the variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>statistic</td>
<td>critical value</td>
</tr>
<tr>
<td>GDP</td>
<td>-1.3240</td>
<td>-2.9810</td>
</tr>
<tr>
<td>M</td>
<td>3.2788</td>
<td>-2.9918</td>
</tr>
<tr>
<td>GE</td>
<td>-2.166</td>
<td>-2.986</td>
</tr>
<tr>
<td>CPI</td>
<td>2.4767</td>
<td>-2.9918</td>
</tr>
</tbody>
</table>

Source: research findings

According to the table 1, except M the remaining variables are not stationary because the calculated statistic absolute value of Augmented Dickey Fuller (ADF) is smaller than the related critical values. By repeating Dickey Fuller test for the first difference of variables it was determined that CPI becomes stationary with a single differencing (cointegrated from the first degree) and other variables become stationary with double-differencing (cointegrated from the second degree). Since the cointegration degree of all variables is not the same, to study cointegration (long-term relationship) the Auto Regressive Distributed Lag (ARDL) was used for estimation of the dynamic and long-term relationship as well as error correction. To estimate this model, at first the number of optimal lags was obtained via Schwartz criterion according to which the number of optimal lags was set 1 for the growth rate of GDP and zero for other variables. Then, auto regressive model was estimated. Estimation results are provided in table 2. According to this table, all variables are statistically significant at least at significance level of 95%. In addition, the effect of government expenditures is positive and equal to 0.887 indicating that the growth rate increases to 0.887 per unit increment in government expenditures. Lagged growth rate also provides a positive impact on economic growth so that per unit increment of
lagged growth rate the economic growth rate increases by 0.313 units. As shown by table 2, money supply makes a significant and negative impact on economic growth so that per unit increment in money supply the economic growth decreases by as much as 0.98 and due to the prices level rising, the growth increases by 0.04.

Table2. Autoregressive Distributed Lag Estimates

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Significant test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>2.56</td>
<td>5.252</td>
<td>Significant</td>
</tr>
<tr>
<td>GDP_{t-1}</td>
<td>0.313</td>
<td>2.38</td>
<td>Significant</td>
</tr>
<tr>
<td>GE</td>
<td>0.887</td>
<td>3.421</td>
<td>Significant</td>
</tr>
<tr>
<td>M</td>
<td>-0.98</td>
<td>-3.299</td>
<td>Significant</td>
</tr>
<tr>
<td>CPI</td>
<td>0.04</td>
<td>3.27</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Source: research findings

In the next stage of the model empirical analysis, the below hypothesis was tested in order to examine that the long-term relationship obtained from the model estimation is reliable and non-false.

\[ H_0 = \sum_{i=1}^{p} \phi_i - 1 \geq 0 \]

\[ H_0 = \sum_{i=1}^{p} \phi_i - 1 < 0 \]

Where \( \phi_i \) is the coefficients of dependent variable lags (here GDP). Null hypothesis states the lack of accumulation or a long-term relationship between variables since a dynamic short-term relationship trends towards a long-term one provided that the sum of coefficients becomes less than 1. To test this hypothesis the test statistic was obtained as follows:
\[
\frac{0.313 - 1}{0.129} = -5/32
\]

Because the absolute value of this computational statistic is greater than the absolute value of critical values provided by Banerjee, Dolado and Mestre, the null hypothesis is rejected and it is accepted that there is a long-term relationship between the variables. The results of estimating the long-term relationship are presented in the table (3). According to the table, all the estimated coefficients are significant at 95%.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Result (confidence of 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE</td>
<td>0.129</td>
<td>3.932</td>
<td>significant</td>
</tr>
<tr>
<td>M</td>
<td>-0.144</td>
<td>-4.486</td>
<td>significant</td>
</tr>
<tr>
<td>CPI</td>
<td>0.059</td>
<td>4.629</td>
<td>significant</td>
</tr>
</tbody>
</table>

Table 3 Estimated Long Run Coefficients using the ARDL Approach

Source: research findings

Equations Diagnostic Tests

To do diagnostic tests in the field of establishing classical assumptions is one of the important aspects of estimating Auto Regressive Distributed Lags. Table 4 displays the results of these tests. As shown by the table, the lack of a serial correlation between the residuals, normality and homoscedasticity of residuals are confirmed. Accordingly, it could be argued that the statistical results of the estimated model are reliable.

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>LM Version</th>
<th>F-Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Serial Correlation</td>
<td>0.7295[.393]</td>
<td>0.6025[.445]</td>
</tr>
<tr>
<td>B:Functional Form</td>
<td>0.4132[.11]</td>
<td>0.5210[.17]</td>
</tr>
<tr>
<td>C: Normality</td>
<td>0.3096[.1]</td>
<td></td>
</tr>
<tr>
<td>D:Heteroscedasticity</td>
<td>0.0286[.865]*F(1.29)</td>
<td>0.0268[.871]</td>
</tr>
</tbody>
</table>

Source: research findings
The existence of cointegration between a set of variables allows the estimation of error correction pattern. Table 5 provides the related results.

Table 5. Estimation of error correction model results

<table>
<thead>
<tr>
<th>variable</th>
<th>coefficient</th>
<th>t-statistic</th>
<th>Variables significance result</th>
</tr>
</thead>
<tbody>
<tr>
<td>dGE</td>
<td>0.887</td>
<td>3.421</td>
<td>significant</td>
</tr>
<tr>
<td>dM</td>
<td>-0.98</td>
<td>-3.299</td>
<td>significant</td>
</tr>
<tr>
<td>dCPI</td>
<td>0.040</td>
<td>3.272</td>
<td>significant</td>
</tr>
<tr>
<td>ecm(-1)</td>
<td>-0.68</td>
<td>-5.206</td>
<td>significant</td>
</tr>
</tbody>
</table>

Source: research findings

As shown by table 5, all variables are statistically significant at the significance level of 95% in the estimated error correction model. The error term ECM indicates that what percentage of short-term imbalance is adjusted in each period in order to reach a long-run equilibrium, or how many periods it takes that the government expenditures return to its long-term trend. This term was obtained (-0.68) in the estimated model that is statistically significant. This figure shows that 68 percent of the growth imbalance in each period will be corrected in the next period.

Conclusion

The gross domestic product (GDP) level and its growth rate are of the most important performance indices of the microeconomics and to achieve a high economic growth is an important objective of any economic system. This implies the adoption of appropriate economic policies, stability of economic policies as well as recognition of the factors which affect economic growth. The main purpose of this study was to investigate the relationship between four key macroeconomic variables of economic growth, money supply, inflation and government expenditures in Iran economy. According to the results obtained from the estimated autoregressive model, all variables are statistically significant at least at the significance level of
95%. Government expenditures, the lagged growth rate and prices level rising impact the economic growth positively whereas money supply makes a negative and significant impact on it. Moreover, ECM error term shows that 68 percent of the growth imbalance in each period will be corrected in the next period.
References


