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Article

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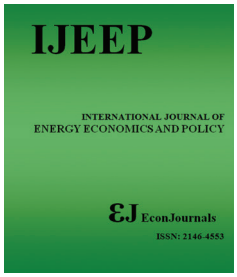

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Effects of Government Investment in Energy Sector on Growth, Employment and Private Investment in Iran

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ABSTRACT

This research analyzes governmental investment effects in energy sector including subsectors of oil, gas and electricity on growth, private investment and employment in agriculture, industry and mining, and services during 1971-2013. We use vector autoregressive models in order to derive the response of variables, impulse response function and variance decomposition. The results indicate that governmental investment influence growth in agriculture, industries and mining, and services negatively but in median-term, it influences agriculture, and industries and mining positively. Effect of government investment is positive for private investment. In industries and mining sector, the relationship is positive in long term and negative in middle term.

Keywords: Energy Sector, Government Investment, Economic Growth, Employment, Private Investment, Vector Autoregressive Method
JEL Classifications: C01, O16, E24, 040, H54

1. INTRODUCTION

The 2008 financial crisis reminded the importance of financial policies and necessity of intervention of government in the economy. Undoubtedly, government can stimulate economic growth and development by participation in economic activities, but how to intervene depends on prevailing economic structure in each country. One way for intervening government in economy is to invest in different sectors through allocating some public funds to civil projects.

Energy sector, which includes oil, gas and new energies, provides significant primary energy, gross domestic product and foreign earnings and play important role in preparing requirements for growth and development. In this regard, government invests in energy sector by allocating a portion of budget, and tries to attain different goals such as increase in oil and gas production capacity, keeping anticipated production capability proportional to economic growth and development plans, completion of value chain of petrochemical products and optimization of energy use in various sectors (Industry, Construction, and Transport).

This research answers to this question: How does government investment spending in energy sector affect growth, private investment and employment in agriculture, industry and mining, and services sectors?

After introduction, this paper is organized in 4 sections. Theoretical basics are presented in Section 2. Empirical studies are summarized in Section 3. Methodology is explained in Section 4. Finally, Section 5 is devoted to conclusions.

2. THEORETICAL BASICS

2.1. Government Expenditure and Economic Growth

As a pioneer, Hobbes[1] (2006) introduced the relationship between government expenditure and economic growth. Hobbs pointed out that this relationship is positive with regard to invest in infrastructure projects. Theoretical studies on the relationship between government expenditure and economic growth are summarized in two viewpoints. First viewpoint claims that increase

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in government expenditure affects negatively economic growth. The reasons for such effect are as follows:

- Governments cannot allocate resources optimally;
- There is diminishing returns to government expenditure because of lack of public sector efficiency;
- Private sector activities decrease due to transfer of funds from private to public sector, and
- Governments have no profit-seeking incentives and do not act competitively (Mahmoudi et al., 2014; Dezhpasand and Goudarzi, 2010).

The second viewpoint believes that government prepares necessary grounds to reach economic growth by providing public and private goods, protecting ownership rights, establishing financial and monetary system (Ghetmiri et al., 2006).

As well, there is the other theoretical views, which point to nonlinear relationship between government expenditure and economic growth stating that government expenditure increases economic growth to some extent. Hence, if government expenditure increases without limitation, it expectedly will reduce economic growth (Piraee and Norouzi, 2012, Dezhpasand and Goudarzi, 2012).

2.2. Government Expenditure and Private Investment

In economic literature, there are three viewpoints on relationship between government expenditure and private investment:

1. Classic view, which is known as Ricardian Equivalence, is based on two hypotheses: First, the consumers are assumed intellectual and futuristic. Thus, consumers regard reductions in taxes due to increasing budget deficit as future debts not permanent income. Hence, they do not change their consumption and save this transient income in order to pay more taxes in the future. Second, financing budget deficit through borrowing is compensated by increases in saving, so that increase in budget deficit due to reduction in current taxes create the same amount of increased taxes in the future. As a result, financial saving and interest rate remain unchanged and private investment does not alter. Therefore, Ricardo argues that budget deficits are not substituted by private expenses and government expenditure has no influence upon financial decisions by private sector (Barro, 1989; Darrat and Suliman, 1991; Link, 2006).
2. Neoclassic view: Considering full employment and efficiency of rate of interest in keeping capital market in equilibrium, this view believes that any increase in government expenditure increases rate of interest (Beck, 1993; Voss, 2002; Ganelli, 2003; Elahi et al., 2015). Thus, increase in rate of interest reduces private investment, and increase in government expenditure causes crowding-out effect by reducing private sector investment.
3. Keynesian view: Keynesians believe in lack of full employment and existence of unemployment in economy. They state that increase in government expenditure is of little effect on rate of interest because of low elasticity of investment with respect to interest rate. In this view, increased government expenditure through positive effect on investors' expectations increases the investments made by private sector (Aschauer, 1989a and 1989b; Baldacci et al., 2004). The proponents of this school believe that increase in government expenditure leads to improvement in infrastructure and increases private investment, since increased government expenditure stimulates private investment by reducing cost of production of firms (Hussain et al., 2009). Thus, it can be said that Keynesians believe that government intervention do not create crowding out effect, but it encourages and supports the private investment in economy.

2.3. Government Expenditure and Employment

The mechanism of effectiveness of government expenditure on employment in the form of fiscal policies differs among economic schools over time. Given competitive markets, the classics believe that equilibrium and full employment are met permanently, and any short-run disequilibrium is regarded temporary and transient. Thus, there is no need to government intervention in the economy. The distortions in labor market will be balanced due to complete flexibility of wages and prices (Taghavi and Rezaee, 2005).

Keynesians believe in involuntary unemployment and lack of complete flexibility in prices and wages. They attribute the causes of employment fluctuations to aggregate demand changes and argue that increase in government expenditure results in increasing output and employment.

Focusing on the role of money in the economy and natural rate of unemployment, the monetarists point to ineffectiveness of fiscal policies and believe that governments can promote output and employment by monetary policies in short term (Shakeri, 2010).

In new classic school, derived from monetarist school in the 1970s, according to adaptive expectations hypothesis, it is argued that planned government intervention has no effect on real variables, thus fiscal policies have no impact on employment.

Contrary to new classics, real business cycles school interprets the nature of cycles real and balanced, and believes that increase in government purchases reduces the consumption and increases the supply of labor, because of higher interest rate and negative wealth effect. Stating nominal and real wage and price rigidities, New Keynesians believe that a typical economy may deviate from its balanced level in short term, and since economy cannot absorb shocks and maintain full employment, so monetary and financial policies can effect on economy. In addition, government can influence the employment level through limiting the power of labor unions and correcting information on labor market (Shakeri, 2010).

3. EMPIRICAL STUDIES

Using auto-regressive distributed lags (ARDL) and variance decomposition, Shafiee et al. (2006) examined the effects of fiscal policies on economic growth in Iran during 1959-2003. The findings indicate that capital investments and taxes are of direct and indirect effects on economic growth, respectively, but current expenditure has no significant effect on economic growth. This research recommends that government should lower its current expenditure rather than its capital investments, since current

expenditure does not lead to economic growth but it results in inflation.

Agheli et al. (2009) identified the effects of fiscal policies' shocks on macroeconomic variables in Iran using ARDL over the period 1971-2006. They found significant short-run and long-run relationships among fiscal policies and real consumption of private sector in economic recession and boom periods. They concluded that positive fiscal shocks of government expenditure affect positively real consumption of private sector in both recession and boom period, but negative fiscal shocks resulting from increased government tax incomes have opposite impact on real consumption of private sector in different economic settings.

Abbasian and Hashem Beigi (2006) studied the effects of shocks derived from government expenditure in economic, social, defense and public affairs on employment in agriculture, industries and services during 1978-2006 by VAR method. They concluded that the shocks from government expenditure are of positive effects in medium or long term, and have negative impacts on sectoral employment in the short-term. As well, industrial employment positively correlates to government expenditure in defense and economic affairs; agricultural employment has positive and negative relations with public expenditure in social and economic affairs, respectively. In addition, employment in services has direct relationship with public expenditure in economic affairs but negative relationship with social and community affairs.

Using VAR method, Daeikarimzadeh et al. (2011) investigated the effect of government investment in transportation sector on the Iranian economic growth during 1973-2008. According to findings, public investment has positive and significant effect on national gross product (GDP) in short term. In addition, the long run elasticity of GDP with respect to public investment in transportation sector is positive and significant as much as 0.08.

Kazemi and Arabi (2014) examined the effect of current expenditure and capital investment by government on private investment during 1962-2010 by ARDL method. They showed that current expenditure has negative effect on private investment, but public capital investment has positive but insignificant impact on private investment.

Devarajan et al. (1996) classified government expenditure into capital expenditure and current expenditure for developing countries during 1970-1990. They concluded that current expenditure influence GDP per capita negatively whereas capital expenditure has positive but weak effect on GDP per capita.

By estimating diesel use in the Iranian agriculture sector, Agheli (2015) showed that government policy on cutting energy subsidies is not enough for reducing diesel consumption. He proposed non-price measures such as innovations in inter-fuel substitution technologies and efficient machineries to manage energy uses in agriculture.

Ghali (1998) examined the relationship between private and public investment by vector error correction model (VECM), Johansen-Juselius co-integration test and Granger causality test. He concluded that public investment affects both economic growth and private investment negatively in the long term, while it influences negatively private investment but has no impact on economic growth in the short term.

Wang (2005) estimated the effect of public investment on economic growth by co-integration model in Canada during 1961-2000. He concluded that some public expenditure components has positive effect on economic growth whereas investment in infrastructure and social security have negative effects on economic growth.

Using a VAR model, Kamps (2005) measured the elasticities of private investment, employment and output with respect to public investment among 22 selected countries. He found that in all sample countries except for Japan and Portugal, public capital stock has positive effect on total product. As well, in the countries under study except for Belgium, Japan and US, public investment supports private investment.

Using VAR method for 14 countries including Canada, Japan, America and European countries, Afonso and St Aubyn (2009) concluded that private investment is more elastic than public investment. In addition, most of these countries has recorded positive marginal productivity and crowding out effect for governmental investment.

Forni et al. (2009) applied a dynamic stochastic general equilibrium model to measure the economic effects of fiscal policies among European countries. They concluded that increase in government expenditure leads to increase in private consumption and decrease in private investment.

Using data on 12 Euro zone countries over the period 1980-2003, Pereira and Pinho (2011) concluded that public investment has positive and significant effect on private investment and employment for all countries except for Austria, Luxemburg, Netherland and Belgium. As well, public investment has negative effect on aggregate output in Austria, Belgium, Luxemburg and Netherland, but in Portugal and Spain, such investment is of positive effect on economic growth.

In a study on 116 developing countries during 1980-2006, Cavallo and Daude (2011) discussed relationship between private and public investment. They found that public investment can make crowding in by enhancing private investment on one hand, while limited access to financial resources can make crowding out though reducing positive effects of public investment projects on the other hand. The results indicate that effect of crowding out is more than that of crowding in. Evidently, this effect has been modified in countries with powerful institutions and economies having more foreign trade.

In a research on United States, Auerbach and Gorodnichenko (2013) concluded that increase in investing in infrastructure results in increased total product and employment in the short term. According to results, this effect will be modified by change in size of economy.

Using ARDL method, Attari and Javed (2013) found a negative relationship between government expenditure and economic growth in Pakistan during 1980-2010.

Abiad et al. (2015) investigated the effects of public investment in developed countries. They concluded that increase in public investment induces the increased production in both short term and long term, creates crowding-in effect in private investment, and reduces the aggregate employment.

4. METHODOLOGY

In this research, a vector auto-regressive (VAR) model is used to measure the effects of public investment in energy sector on growth and employment in agriculture, industries and mining activities. To do this, the impulse-response function and variance decomposition analysis are applied over the period 1971-2013.

A VAR model is framework in which each variable is fitted on its lagged values and values of all other variables. The supporters emphasize that VAR model is better than other simultaneous models because of its simplicity in functional form (and use of OLS method), no need to division of variables into endogenous and exogenous categories, and prediction of all variables (Enders, 2004).

If Y_t is vector of time series, which can be modeled by multivariate process of its lagged values, it can be written as follows:

$$Y_t = \varphi_1 Y_{t-1} + \ldots + \varphi_p Y_{t-p} + U_t + \theta_1 U_{t-1} + \ldots + \theta_q U_{t-q} \quad (1)$$

In which, squared matrices of $\varphi_p \ldots \varphi_1, \theta_1 \ldots \theta_q$ include parameters to be estimated and U_t denotes the disturbance terms. The estimation of such models is relatively difficult. A multivariate auto-regressive process is written as follows:

$$Y_t = \varphi_1 Y_{t-1} + \ldots + \varphi_p Y_{t-p} + U_t \quad (2)$$

This model is called "VAR model" (Noferesti, 2008).

4.1. Variables

In this research, the variables under consideration are listed in the following:

CGIE: Changes in government investment in energy sector (oil, gas and electricity)
CADVAG: Changes in value-added in agriculture
CADVIM: Changes in value-added in industry and mining
ACDVS: Changes in value-added in services
CIMPAG: Changes in agricultural employment
CIMPIM: Changes in employment in industry and mining
CIMPS: Changes in employment in services
CPINAG: Changes in private investment in agriculture
CPINIM: Changes in private investment in industry and mining
CPINS: Changes in private investment in services.

Variable of public investment in energy sector (oil, gas and electricity) is derived from "Monitoring Reports on civil projects" published by Planning and Management Organization (PMO) of Iran. Since there are no figures for private investment in different economic sectors in Iran, by using size of government in Iran's economy (Bazahmadi and Cheshmi, 2006), the values of private investment are estimated. In addition, data on sectoral value-added was extracted from national accounts of CBI, and data on employment are from Amini and Farhadi Kia (2015).

4.2. Model Estimation and Results

In this research, nine models are estimated as follows:
Model 1: CADVAG = F(CGIE, CIMPAG, CPINAG)
Model 2: CADVIM = F(CGIE, CIMPIM, CPINIM)
Model 3: CADVS = F(CGIE, CIMPS, CPINS)
Model 4: CIMPAG = F(CGIE, CADVAG, CPINAG)
Model 5: CIMPIM = F(CGIE, CADVIM, CPINIM)
Model 6: CIMPS = F(CGIE, CADVS, CPINS)
Model 7: CPINAG = F(CGIE, CADVAG, CIMPAG)
Model 8: CPINIM = F(CGIE, CADVIM, CIMPIM)
Model 9: CPINS = F(CGIE, CADVS, CIMPS).

In estimating VAR model, the first step is to examine the stationary of variables. If the variables are not stable, estimations lead to spurious regression. Thus, generalized Dickey-Fuller test (DF test) is used to test for stationary of variables. The results given in Table 1 show that all variables except for CIMPAG are I(0) in 5% level of significance.

Since variable of changes in agricultural employment (*CIMPAG*) is I(1), and it is likely to be lost the long term information with differencing, it is necessary to test for co-integration in order to secure a long term relationship among variables and then estimate co-integrating vectors. Obviously, the number of lags of variables should be determined before testing for co-integration. Due to period under study, number of lags is selected by Akaike information criterion and the results are reported in Table 2.

The results of co-integration test confirm at least one long-term vector. Thus, one can interpret long-term relationship among variables (Table 3).

4.3. Estimation of VAR model

The estimation results for VAR system is reported in Table 4. The figures in each row indicate the effects of explanatory variables on dependent variable.

Table 1: Results of generalized Dickey-Fuller test

Variable	ADF test statistic	10% critical value	5% critical value	%1 critical value
CGIE(C,T)	−9.16	−3.19	−3.52	−4.2
CAVAG(C,T)	−6.21	−3.2	−3.54	−4.23
CAVIM(C,T)	−5.35	−3.19	−3.52	−4.2
CAVS(C,T)	−3.57	−3.19	−3.52	−4.2
CIMPAG(C,T)	−3.47	−3.2	−3.53	−4.21
CIMPIM(C,T)	−3.71	−3.2	−3.53	−4.21
CIMPS(C,T)	−3.92	−3.2	−3.53	−4.21
CPINAG(C,T)	−8.16	−3.19	−3.52	−4.2
CPINIM(C,T)	−4.78	−3.19	−3.52	−4.2
CPINS(C,T)	−5.97	−3.19	−3.52	−4.2

Source: Research findings

4.4. Impulse-response functions

The impulse-response functions indicate that if a shock by one standard deviation (1-sd) is imposed on each endogenous variable in a VAR model, what effect will be observed in current and future values of that variable and other variables. Figures 2-3 illustrate the impulses on growth, private investment and employment due to 1-sd innovation in public investment in energy sector.

Table 2: Optimal lag selection

Studied model	Optimal lag	HQ	AIC	SC
Model 4,1,7	3	75.03	74.24	76.5
Model 2,5,8	2	83.74	83.19	84.76
Model 3,6,9	1	86.64	86.34	87.21

Source: Research findings

Table 3: Results of co-integration test

Models 1،4،7	H_0	H_1
λ_{trace}		
100.41	r=0	r≥1
45.37	r≤1	r≥2
21.5	r≤2	r≥3
9.47	r≤3	r≥4
λ_{max}		
55.04	r=0	r≥1
23.87	r≤1	r≥2
12.03	r≤2	r≥3
9.47	r≤3	r≥4

Source: Research findings

4.4.1. Impulses on growth

Figure 1 shows the impulse to growth due to 1-sd in public investment in energy sector. The first model measures the impulses on agricultural value- added (AVA) because of 1-sd change in public investment. The increase in public investment by 1-sd has no effect on AVA in the first period, but reduces AVA in the second period and increases it in the third period. The fluctuations in AVA last until 9th period, and approaches to zero in the long-term.

In the second model, an increase in public investment by 1-sd has no effect on industry and mining value-added (IMVA) in the first period, but increases IMVA in the second period, which lasts with oscillation until 5th period. This effect is negative in the 6th period, but it becomes positive from 9th period onwards. Finally, this effect disappears in the long-term.

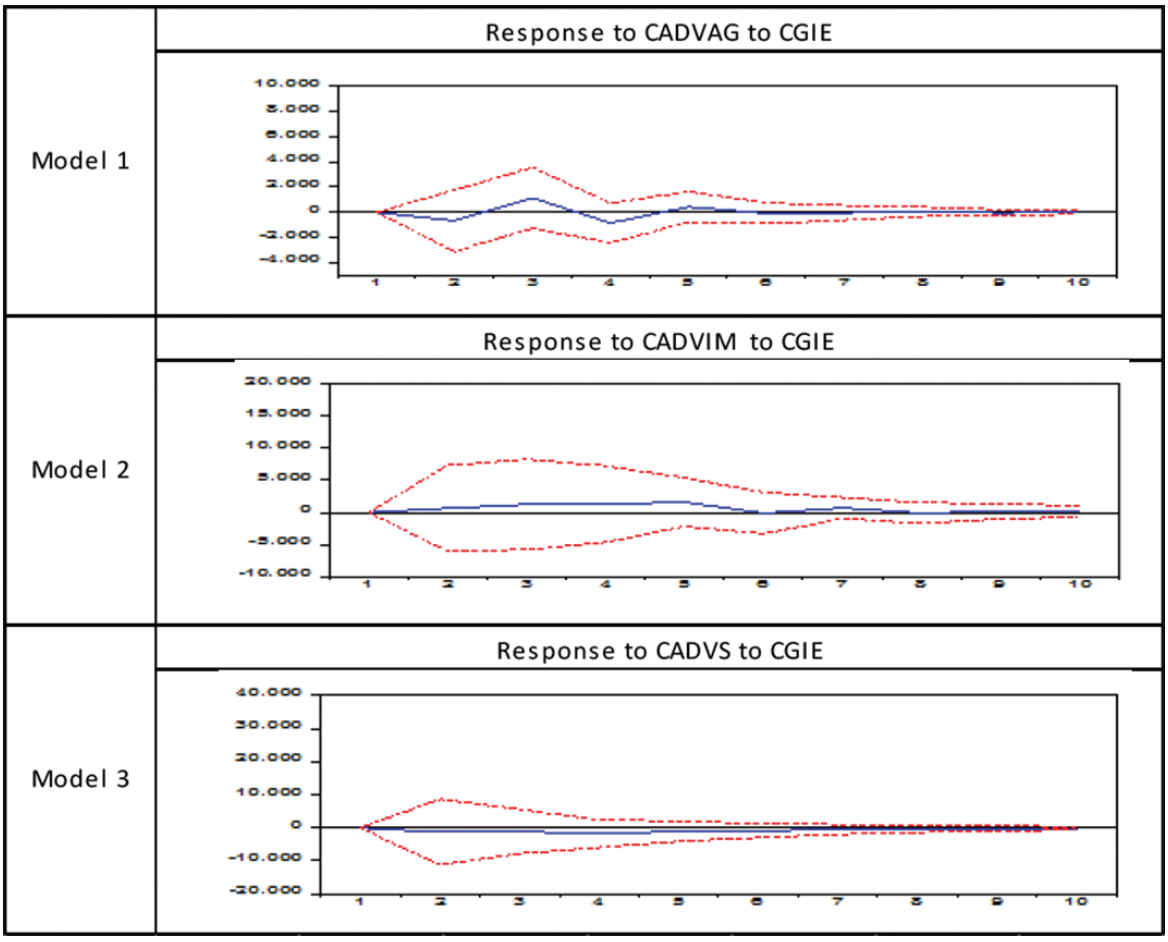
In the third model, an increase in public investment in energy sector has negative effect on services value-added (SVA) in all periods but first period, so that the effect is oscillatory until 4th period, and finally approaches to zero.

4.4.2. Impulses on employment

Figure 2 shows the impulse to employment due to 1-sd in public investment in energy sector.

According to the 4th model, an increase in public investment in energy sector by 1-sd has no effect on agricultural employment

Figure 1: Impulse-response functions: Growth



Source: Research findings

Table 4: VAR Estimation results

Model	Dependent variable	CADVAG(−1)	CADVAG(−2)	CGIE(−1)	CGIE(−2)	CIMPAG(−1)	CIMPAG(−2)	CPINAG(−1)	CPINAG(−2)
First model	CADVAG	−0.070	−0.255	−4.800	5.229	0.002	−0.005	−1.60	0.591
		[−0.38]*	[−1.469]	[−0.850]	[0.924]	[0.035]	[−0.098]	[−1.831]	[0.711]
Second model	CADVIM	CADVIM(−1)	CADVIM(−2)	CGIE(−1)	CGIE(−2)	CIMPAG(−1)	CIMPAG(−2)	CPINAG(−1)	CPINAG(-1)
		0.245	0.312	−11.460	2.395	0.111	−0.060	0.547	−0.031
		[1.291]	[2.402]	[−0.935]	[0.195]	[4.137]	[−1.894]	[2.244]	[−0.115]
Third model	CADVS	CADVS(−1)	CGIE(−1)	CIMPAG(−1)	CPINAG(−1)				
		0.392	−18.844	0.0773	0.677				
		[3.033]	[−0.899]	[2.180]	[3.371]				
Fourth model	CIMPAG	CIMPAG(−1)	CIMPAG(−2)	CGIE(−1)	CGIE(−2)	CADVAG(−1)	CADVAG(−2)	CPINAG(−1)	CPINAG(−2)
		0.510	0.266	1.518	−6.568	0.165	−0.128	−2.943	−1.913
		[2.586]	[1.350]	[0.076]	[−0.331]	[0.254]	[−0.21]	[−0.966]	[−0.655]
Fifth model	CIMPIM	CIMPIM(−1)	CIMPIM(−2)	CGIE(−1)	CGIE(−2)	CADVIM(−1)	CADVIM(−2)	CPINIM(−1)	CPINIM(-2)
		0.256	0.472	9.079	−14.18	−2.315	0.674	3.225	−1.936
		[1.315]	[2.056]	[0.102]	[−0.160]	[−1.685]	[0.716]	[1.825]	[−0.965]
Sixth model	CIMPS	CIMPS(−1)	CGIE(−1)	CADVS(−1)	CPINS(−1)				
		0.416	−206.708	0.0703	−0.644				
		[2.804]	[−2.356]	[0.131]	[−0.767]				
Seventh model	CPINAG	CPINAG(−1)	CPINAG(−2)	CGIE(−1)	CGIE(−2)	CADVAG(−1)	CADVAG(−2)	CIMPAG(−1)	CIMPAG(−2)
		−0.129	0.0784	0.023	1.187	0.002	−0.072	0.026	−0.012
		[−0.645]	[0.407]	[0.018]	[0.907]	[0.06]	[−1.773]	[2.005]	[−0.942]
Eight model	CPINIM	CPINIM(−1)	CPINIM(−2)	CGIE(−1)	CGIE(−2)	CADVIM(−1)	CADVIM(−2)	CIMPIM(−1)	CIMPIM(−2)
		0.315	−0.244	−0.473	8.391	0.021	−0.163	0.016	−0.006
		[1.766]	[−1.210]	[−0.053]	[0.936]	[0.151]	[−1.709]	[0.826]	[−0.250]
Ninth model	CPINS	CPINS(−1)	CGIE(−1)	CADVS(−1)	CIMPS(−1)				
		0.039	3.087	0.113	0.016				
		[0.219]	[0.166]	[0.981]	[0.525]				

*Numbers in brackets denote t statistic. Source: research findings

(AE) in the first period, but this effect becomes positive in the next period. From the 3rd period onwards, the effect of such policy on AE is negative. This effect is oscillatory until 7th period. This effect disappears from the 7th period onwards.

In the fifth model, public investment in energy sector has no effect industry and mining employment (IME) in the first period, but it reduces the IME in the second period. This reduction is switched to positive effect in the next period and after that takes negative effect. From the 3rd period onwards, there is a decreasing negative effect on IME.

The sixth model indicates that public investment in energy sector has an increasing negative effect on services employment (SE) in all periods except for the first period. This effect weakens in the end periods and disappears in the long-term.

4.5. Impulse to Private Investment

Figure 3 shows the impulse to private investment due to 1-sd in public investment in energy sector. According to the 7th model, public investment in energy sector has no effect on private investment in agriculture in the first period. This effect gets positive and increasing in the second and third periods. This positive effect indicates supportive role played by government in agriculture in the short-term. This effect gets negative and positive in the 4th and 5th periods, respectively, but it gets negative from 6th period onwards. This negative effect disappears in the long-term.

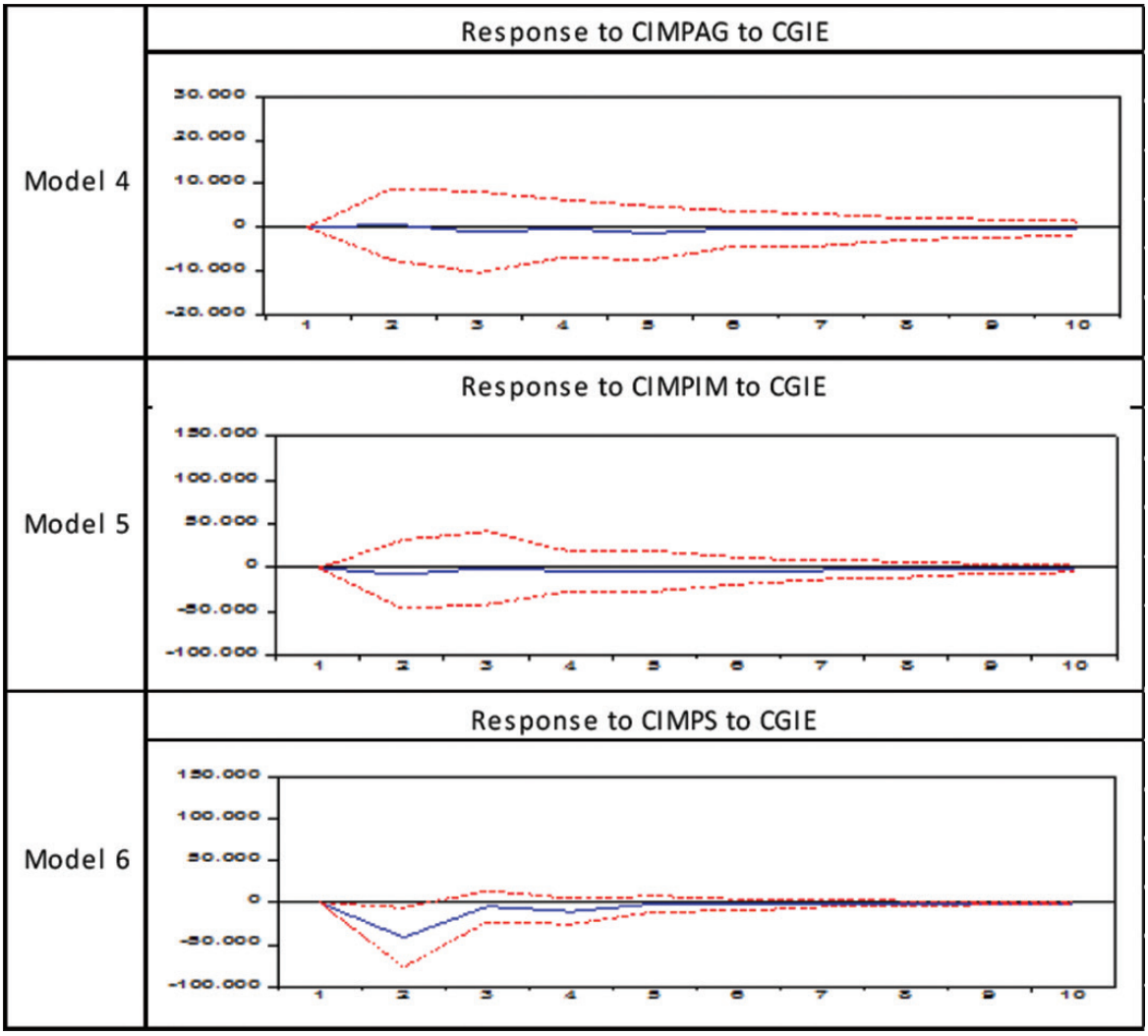
In the eighth model, an increase in public investment has no impact on private investment (PI) in industry and mining in the first period, but it increases PI with a decreasing rate in the second and third periods. This effect is oscillatory negative from 4th to 8th periods, and it gets positive and disappears from 9th period onwards.

According to the ninth model, public investment in energy sector has no effect on private investment in services in the first period. It increases PI in the second period. This effect gets negative and oscillatory from the 3rd period onwards. It disappears in the long-term.

4.6. Variance Decomposition

The variance decomposition shows that how many percentages of changes in dependent variable are explained by that variable and the other endogenous variables in VAR model. Table 5 reports the

Figure 2: Impulse- response functions: Employment



Source: Research findings

Table 5: Variance decomposition of variables

Period	CADVAG	CAGVIM	CADVS	CIMPAG	CIMPIM	CIMPS	CPINAG	CPINIM	CPINS
1	0	0	0	0	0	0	0	0	0
2	0.853	0.119	0.126	0.069	0.394	9.977	0.084	0.029	0.175
3	3.021	0.472	0.191	0.175	0.361	9.46	1.76	1.261	0.316
4	4.118	0.825	0.393	0.168	0.392	9.902	1.896	1.202	0.315
5	4.381	1.361	0.454	0.315	0.457	9.87	1.878	1.199	0.338
6	4.376	1.359	0.499	0.31	0.513	9.897	1.878	1.305	0.339
7	4.378	1.443	0.513	0.33	0.542	9.895	1.876	1.313	0.343
8	4.381	1.444	0.52	0.336	0.555	9.896	1.875	1.313	0.343
9	4.382	1.45	0.522	0.338	0.558	9.896	1.874	1.312	0.344
10	4.382	1.452	0.523	0.341	0.561	9.896	1.873	1.312	0.343

Source: Research findings

results of variance decomposition because of changes in public investment in energy sector.

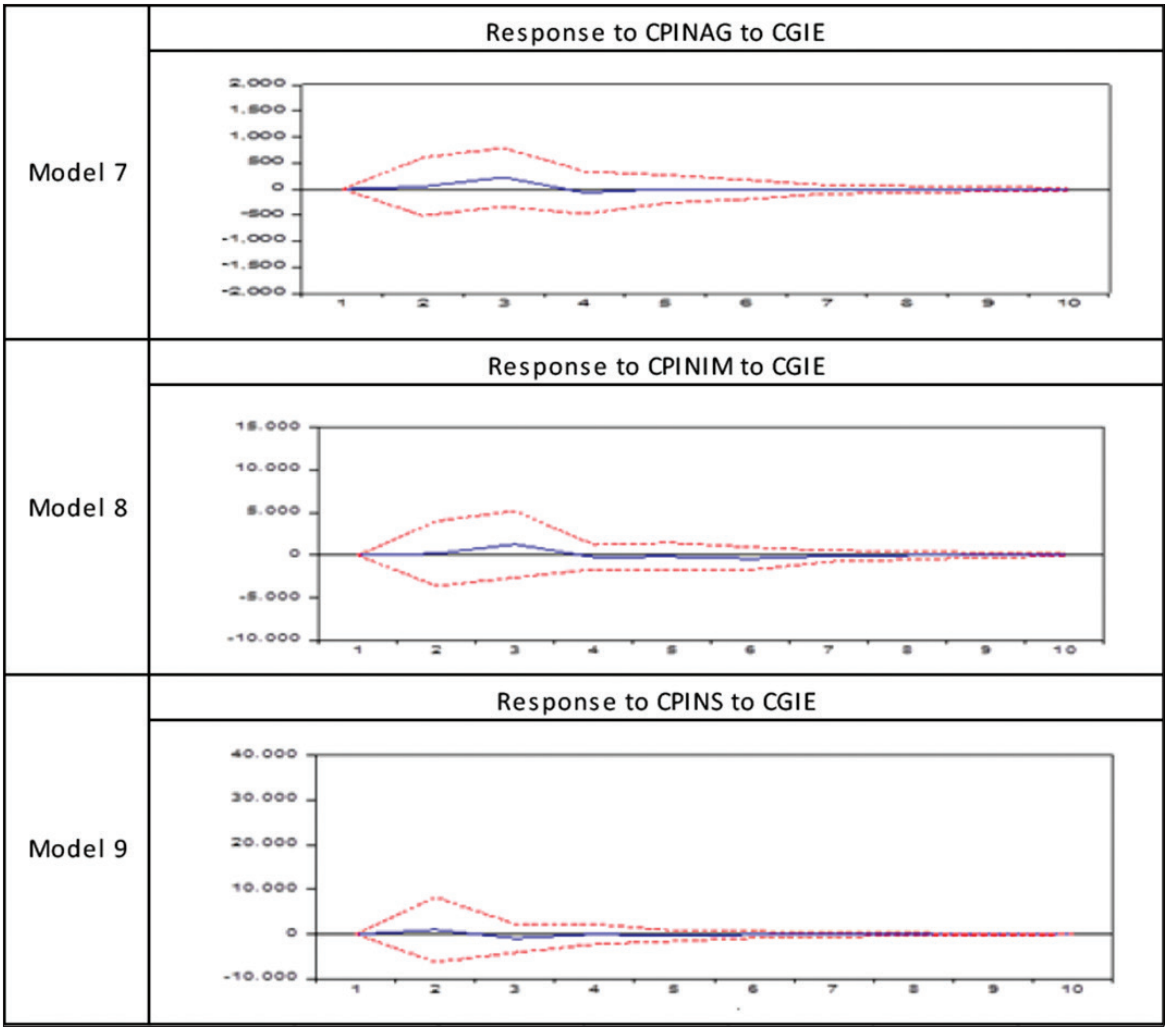
As shown in Table 5, the changes in public investment in energy sector (CGIE) only explains a little variations in dependent variable in each model over time. The changes in employment in services (CIMPS) explain highest portion of CGIE, however changes in agricultural employment(CIMPAG) and changes in private investment (CPINS) explain the lowest portion of CGIE.

The magnitude of effectiveness of CGIE is low, since the effect of public investment in energy sector is transferred to growth, private investment and employment,

5. CONCLUSION

In this research, with regard to relationship between government expenditure and behavior of macroeconomic variables, we discussed the effects of government expenditure in energy section

Figure 3: Impulse response functions: Private Investment



Source: Research findings

on growth, private investment and employment in three main sections of Iran' economy. In the first step, using VAR method we considered stationary of variables under study. Since CIMPAG was integrated of degree one, i.e. I(1), we used co-integration test to ensure the long term relationship among variables.

The results indicated that government investment in energy sector had negative but insignificant effect on agriculture, industry and mining in short term. In medium term, this effect was positive for agriculture and mining but in services sector, this relationship became more negative.

On the relationship of government investment in energy sector and employment in the other sectors, firstly, we concluded positive effects on employment in agriculture, and industry and mining, but this effect decreased by increasing government expenditure in the middle term. In services sector, this relationship is negative which indicates small effectiveness of government spending in energy sector on employment. In the long term, this effect disappeared.

Results on relationship between government investment in energy sector and private investment indicated that government supports privatization in agriculture largely in both short term and long term. In industry and mining sector, this relationship was negative in the short term and middle term. In services sector, this relationship was positive in the short term and negative in the long term.

The results from VAR model follows the impulse-response functions. In addition, variance decomposition indicated that public investment in energy sector explains low percentage of changes of variations in dependent variables over time. According to our findings, we emphasize on the importance of government and effectiveness of its policies on macro-economy variables. This can be interpreted by other investments made by government in the other sectors including productive, infrastructure and social affairs.

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