

## **STUDYING THE IMPACT OF GOVERNMENT EXPENDITURES SHOCKS ON MACROECONOMIC VARIABLES OF THE IRANIAN ECONOMY**

### **Dr. Ahmad Assadzadeh**

Assistant professor, Faculty of Economics, Business and Management, University of Tabriz, Tabriz, Iran, Email: assadzadeh@tabrizu.ac.ir

### **Javad Pourqoly**

MA in Business Administration, Tabriz Business Training Center and a consultant in East Azerbaijan Industry, Mine and Trade Organization, Tabriz, Iran, Email: Pouqoly@btc.ac.ir

### **Amin Taslimi Baboli**

PhD student, Faculty of Economics, Business and Management, University of Tabriz, Tabriz, Iran, Email: amintaslimi@tabrizu.ac.ir

### **Fahimeh Ahmadzadeh Deljavan**

MA student, Faculty of Economics, Business and Management, University of Tabriz, Tabriz, Iran, Email: f.ahmadzadeh123@yahoo.com

### **Abstract:**

This paper studies impact of government expenditures shocks on Gross Domestic Product (GDP), personal consumption, trade balance and effective exchange rate. To the purpose, time series data of Iranian macroeconomic variables were used covering from 1976 to 2007. Vector autoregressive (VAR) model, forecast error variance decomposition and momentary reaction functions were used in order to study the impact of government expenditures shocks on macroeconomic variables of Iranian economy. Extracted results from the estimate of VAR model and analyses of forecast error variance decomposition showed that: positive shocks of the government expenditures increase GDP and personal consumption but decrease trade balance. Impact of government expenditures positive shocks decrease effective exchange rate only in first year then government expenditures shocks had positive but very little impact on effective exchange rate.

**Keyword:** *Government expenditures, Personal consumption, Trade balance, Effective exchange rate, Vector autoregressive model*

**Jell classification:** F32, E21, H5, C22

## **1. INTRODUCTION**

Government expenditures is one of the most important fiscal policy tools for macroeconomic balance. Therefor known complication of government expenditures changes and also mechanism of these changes are very important. The impacts of government expenditures shocks on the external sector of the economy, and in particular on the real exchange rate, have received less attention (Monacelli and Perotti, 2006; Corsetti and Muller, 2006; Kim and Roubini, 2008). The empirical finding of a depreciation of the real exchange rate in response to a positive government expenditures shock is striking for it goes against the conventional wisdom. The standard view is that an increase in domestic absorption drives up domestic prices rendering the domestic economy relatively more expensive than the rest of the world. Contrary to this view, the data show that conditional on an unanticipated increase in government spending, the economy in which this innovation originates becomes relatively cheaper than its trading partners.

## **2. THEORETICAL BASIS**

The observed responses of the real exchange rate and private consumption to innovations in government spending are hard to reconcile with the predictions of existing theoretical models of the transmission of government spending shocks. For instance, it is well known that the standard neoclassical model faces serious difficulties explaining the observed expansion in private consumption in response to a positive innovation in government spending. In this model an increase in government spending generates a negative wealth effect that causes an increase in labor supply, a decline in real wages, and a contraction in household spending. The observed real depreciation of the exchange rate following a positive government spending shock is equally challenging for the neoclassical paradigm. In the absence of home bias, an increase in public consumption generates no changes in international relative prices. As a result the real exchange rate is unperturbed by the fiscal shock. In the presence of home bias, the relative price of domestically produced goods in terms of foreign produced goods increases causing the neoclassical model to predict a counterfactual appreciation of the real exchange rate.

Most of modern versions of the Mundell–Flemming IS-LM model with optimizing households and firms and sluggish nominal price adjustment can be

shown to fail to predict real exchange rate depreciation in response to a government spending increase. For example, Monacelli and Perotti (2006) studied the impacts of government expenditures shocks in the context of a neo-Keynesian open-economy model with sticky prices. They showed that the neo-Keynesian framework is unable to generate the observed initial real depreciation in response to a positive innovation in government spending. Extensions of the neo-Keynesian open economy model that allows for rule-of-thumb consumers, while being able to explain qualitatively the rise in consumption, have also been shown to face difficulties explaining the observed initial real depreciation (Erceg et al., 2005).

### **3. LITERATURE REVIEW:**

Chinn (1997) in his paper investigated the long- and short-run determinants of the real exchange rate using a panel of data for fourteen OECD countries. He analyzed his paper data using time series and panel unit root and panel co-integration methods. He used two dynamic productivity-based models to motivate the empirical exercise. In his study the candidate determinants include productivity levels in the traded and in the nontrade sectors, government spending, the terms of trade, income per capita, and the real price of oil. His empirical results indicated that it is easier to detect co-integration in panel data than in the available time series; the estimate of the rate of reversion to a co-integrating vector defined by real exchange rates and sectorial productivity differentials is estimated with greater precision as long as homogeneity of parameters is imposed upon the panel.

Fatás and Mihov (2001) in their Paper compares the dynamic impact of fiscal policy on macroeconomic variables implied by a large class of general equilibrium models with the empirical results from an identified vector autoregressive. In the data they found that positive innovations in government spending are followed by strong and persistent increases in consumption and employment. The effects are particularly pronounced when government wage expenditures increase. They compared these findings to several variations of a standard real business cycle model and they found that the positive correlation in the responses of employment and consumption cannot be matched by the model under plausible assumptions for the values of the calibration parameters.

Blanchard & Perotti (2002) in their paper characterized the dynamic effects of shocks in government spending and taxes on U. S. activity in the postwar period. They used a mixed structural VAR/event study approach. Their identification was

achieved by using institutional information about the tax and transfer systems to identify the automatic response of taxes and spending to activity, and, by implication, to infer fiscal shocks. Their paper results consistently showed that positive government spending shocks as having a positive effect on output, and positive tax shocks as having a negative effect. One of their paper results had a distinctly nonstandard flavor: both increases in taxes and increases in government spending had a strong negative effect on investment spending.

Erceg et al (2005) in their paper used a dynamic general equilibrium model of an open economy to assess the quantitative effects of fiscal shocks on the trade balance in the United States. They examined the effects of two alternative fiscal shocks: a rise in government consumption, and a reduction in the labor income tax rate. Their salient finding was that a fiscal deficit had a relatively small effect on the US trade balance, irrespective of whether the source is a spending increase or tax cut. In their benchmark calibration, they found that a rise in the fiscal deficit of 1 percentage point of gross domestic product (GDP) induces the trade balance to deteriorate by 0.2 percentage point of GDP or less. Noticeably larger effects are only likely to be elicited under implausibly high values of the short-run trade price elasticity, or of the share of liquidity-constrained households in the economy. From a policy perspective, their analysis suggests that even reducing the current US fiscal deficit (of 3% of GDP) to zero would be unlikely to narrow the burgeoning US trade deficit significantly.

Coenen and Straub (2005) in their paper revisited the effects of government spending shocks on private consumption which have been at center stage of the macroeconomic policy debate for quite a long time. They conducted their analysis in an estimated model of the euro area, which is representative of a new generation of dynamic stochastic general equilibrium (DSGE) models usable for quantitative policy analysis. They showed that the inclusion of non-Ricardian households, which simply consume their current disposable income, is in general conducive to raising the level of consumption in response to government spending shocks when compared with a benchmark specification without non-Ricardian households. However, they found that there is only a fairly small chance that government spending shocks crowd in consumption, mainly because the estimated share of non-Ricardian households is relatively low, but also because of the large negative wealth effect induced by the highly persistent nature of government spending shocks.

Bouakez and Rebei (2007) in their paper developed a simple real business cycle

model where preferences depend on private and public spending, and households are habit forming. Their model was estimated by the maximum-likelihood method using U.S. data. Their estimation results indicated a strong Edgeworth complementarity between private and public spending. That feature enables the model to generate a positive response of consumption following a government spending shock

Ravn et al (2007) documented that an increase in government purchases leads to an expansion in output and private consumption, a deterioration in the trade balance, and a depreciation of the real exchange rate (i.e., a decrease in the domestic CPI relative to the exchange-rate adjusted foreign CPI). They used panel structural VAR analysis and quarterly data from four industrialized countries. They proposed an explanation for these observed effects based on the deep habit mechanism. They estimated the key parameters of the deep-habit model employing a limited information approach. The predictions of the estimated deep-habit model fit well the observed responses of output, consumption, the trade balance, and the real exchange rate to an unanticipated government spending shock in their study, also the deep-habit model predicts that in response to an anticipated increase in government spending consumption and wages fail to increase on impact, which is consistent with the empirical evidence stemming from the narrative identification approach. In that paper, the deep-habit model reconciles the findings of the SVAR and narrative literatures on the effects of government spending shocks.

Gali et al (2007) extended the standard new Keynesian model to allow for the presence of rule-of-thumb consumers. They showed that how the interaction of the latter with sticky prices and deficit financing can account for the existing evidence on the effects of government spending.

Mountford and Uhlig (2009) proposed and applied a new approach for analyzing the effects of fiscal policy using vector autoregressive. They used sign restrictions to identify a government revenue shock as well as a government spending shock, while controlling for a generic business cycle shock and a monetary policy shock. They allowed for the possibility of announcement effects, i.e., that a current fiscal policy shock changes fiscal policy variables in the future, but not at present. They constructed the impulse responses to three linear combinations of these fiscal shocks, corresponding to the three scenarios of deficit-spending, deficit-financed tax cuts and a balanced budget spending expansion. They applied the method to US quarterly data from 1955 to 2000. They found that deficit-financed tax cuts

work best among these three scenarios to improve GDP, with a maximal present value multiplier of five dollars of total additional GDP per each dollar of the total cut in government revenue 5 years after the shock.

Ramey (2011) in his paper used Standard vector autoregressive (VAR) identification methods to found that government spending raises consumption and real wages; the Ramey–Shapiro narrative approach found the opposite. He showed that a key difference in the approaches is the timing. Both professional forecasts and the narrative approach shocks Granger-cause the VAR shocks, implying that these shocks are missing the timing of the news. Motivated by the importance of measuring anticipations, he used a narrative method to construct richer government spending news variables from 1939 to 2008. The implied government spending multipliers range from 0.6 to 1.2.

#### **4. ECONOMETRIC METHODOLOGY**

In this part we present a model to study impacts of positive shocks of government expenditures on macroeconomics variables of Iranian economy. We use VAR model to study impacts of shocks. Variables of VAR model shall be stationary to avoid spurious regression. We check stationary of variables by generalized Dickey-Fuller test. We determine optimum lag then estimate the model and at the end we analyze the results by forecast error variance decomposition and momentary reaction function.

##### **4.1 Data**

We use time series data of Iranian economy during the period of 1976 to 2007. Variables present as follows.  $G_T$ : denotes real per capita government consumption spending deflated by the GDP deflator,  $Y_T$ : denotes real per capita GDP,  $C_T$ : denotes real per capita personal consumption of nondurables and services, and  $E_T$ : denotes the real exchange rate defined as the ratio of a trade-weighted average of exchange-rate-adjusted foreign CPIs to the domestic CPI. The data sources are from world development indexes (WDI) data base and they are in 2005 prices.

#### **5. ANALYSES OF EMPIRICAL RESULTS**

##### **5.1 Unit root test**

We shall confide about stationary of variables before estimate VAR model. Non stationary variables cause spurious regression. We taking natural logarithm from all of variables to minimum variance of time series data then check stationary of

variables by augmented Dickey-Fuller (ADF) test. Results of augmented Dickey-Fuller (ADF) test indicate that all of the variables are stationary in the first differential. All of variables are integrated in first order. Table 1 presents results of unit root test.

**Table 1: results of augmented Dickey-Fuller test (ADF)**

result	Critical value (5%)	ADF statistics	test types (c,T,d)	variables
Not stationary	-3.576	-1.942	(C,T,0)	LY
stationary	-3.584	-3.878	(C,T,1)	$\Delta Y$
Not stationary	-3.576	-1.969	(C,T,0)	LE
stationary	-3.580	-3.970	(C,T,0)	$\Delta E$
Not stationary	-3.576	-1.026	(C,T,0)	LG
stationary	-3.580	-5.387	(C,T,0)	$\Delta G$
Not stationary	-3.576	-0.257	(C,T,0)	LC
stationary	-3.580	-4.654	(C,T,0)	$\Delta C$

(c, T, d) are orderly represent intercept, trend and lag lengths.  $\Delta X$  means first order differential of X.

**Source: research findings**

## 5.2 Optimum lag determination

Optimal lag should be determined in VAR model to there was not any auto correlation between residuum. There are different information criteria e.g. Akaike, Hannan-Quinn or Schwartz criterion to determine optimum lag. Table 2 presents results of optimum lag determination. According to this table optimum lag is 4 lag and our model Table 2determined as VAR (4).

**Table 2 : VAR lag order selection criteria**

SC	HQ	AIC	FPE	LR	Log L	Lag
-8.07603*	-8.21093	-8.26801	3.0e-09		115.618	0
-7.31544	-7.98989	-8.27532	3.0e-09	32.197	131.717	1
-6.50427	-7.71829	-8.23205	3.5e-09	30.832	147.133	2
-6.8579	-8.61149	-9.35359	1.4e-09	62.282	178.273	3
-7.14412	-9.43728*	-10.4077*	8.6e-10*	60.461*	208.504	4

**Source: research findings**

## 5.3 Estimation of VAR model

Results of VAR model estimation based on optimum lag are as follows:

(0.39  
-0.14)

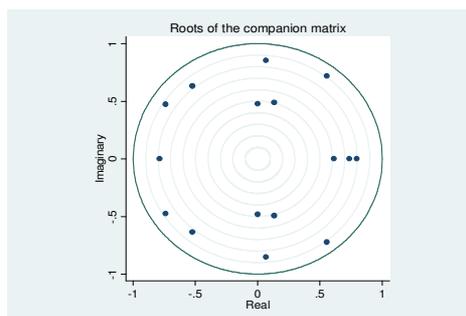
#### 5.4 Test of model stability

Results of model stability test are presented as follows. According to these results all of specially amount coefficients are less than one and they belong to inside the circle so model structure is stable. Because the modulus of each eigenvalue is strictly less than 1, the estimates satisfy the eigenvalue stability condition. Specifying the graph option produced a graph of the eigenvalues with the real components the x axis and the complex components on the y axis. The graph below indicates visually that these eigenvalues are well inside the unit circle.

**Table 3: Eigenvalue stability condition**

Modulus	Eigenvalue
0.908477	0.5534816 + 0.7204088i
0.908477	0.5534816 - 0.7204088i
0.877688	-0.7381387 + 0.4748558i
0.877688	-0.7381387 - 0.4748558i
0.855445	0.06636537 + 0.8528665i
0.855445	0.06636537 - 0.8528665i
0.823516	-0.5257253 + 0.6338705i
0.823516	-0.5257253 - 0.6338705i
0.79377	0.7937702
0.78819	-0.7881899
0.735657	0.7356566
0.609642	0.6096418
0.508563	0.1327997 + 0.4909989i
0.508563	0.1327997 - 0.4909989i
0.479876	0.00067312 + 0.4798759i
0.479876	0.00067312 - 0.4798759i

**Source: research findings**



**Figure 1: model stability**

**Source: research findings**

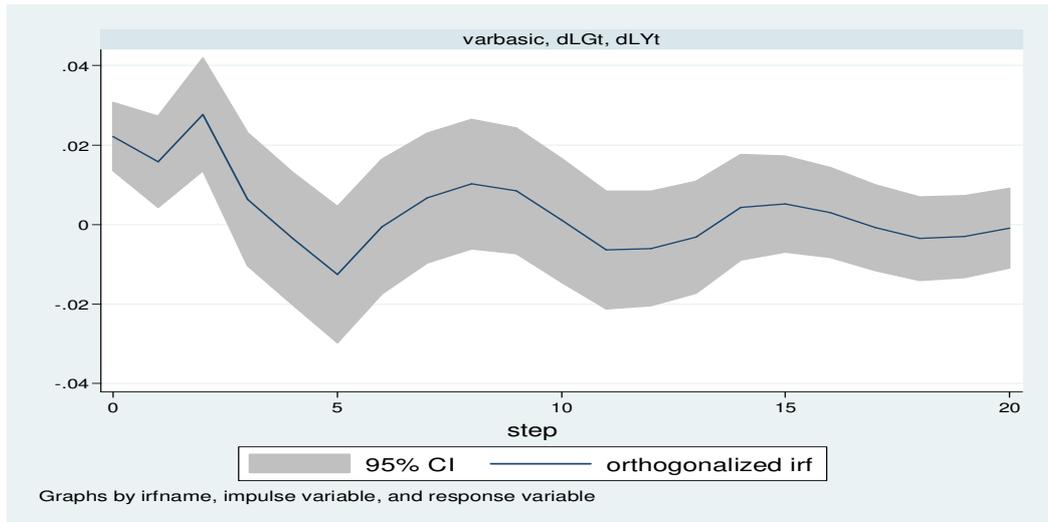
### **5.5 Momentary reaction function**

Figure 2, Figure 3 and Figure 4 indicate dynamic reaction of systems variables from structural shocks in one standard deviation for 20 years in future.

Figure 2 presents reaction of real per capita GDP to one standard deviation of government expenditures shocks. According this figure shock of government expenditures had positive impact on GDP at the first. This impact keep on to 4<sup>th</sup> year and with some variance in some years had negative impact. These negative impacts neutralized at the end of 20th year. So government expenditures shocks had positive impacts on GDP.

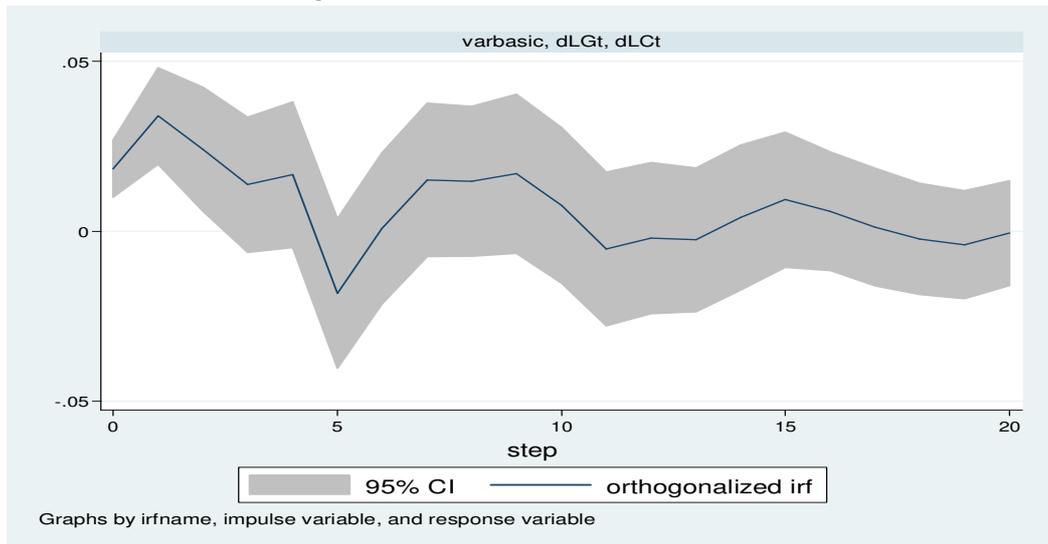
Figure 3 presents impacts of government expenditures shocks on personal consumption of nondurables. According to this figure positive shocks of government expenditures had positive impact on personal consumption of nondurables except 4<sup>th</sup> to 6<sup>th</sup> years. These reactions confront with some variances but these variances decrease during the period and disappearance at the end of period.

Figure 4 presents impacts of government expenditures shocks on real exchange rate. According to this figure positive shocks of government expenditures had negative impact on real exchange rate at the first. These negative impacts keep on to 3<sup>rd</sup> year and after this year mid several variances had positive reaction to government expenditures shocks. These variance decreases during the time but after this period positive impact still keep.



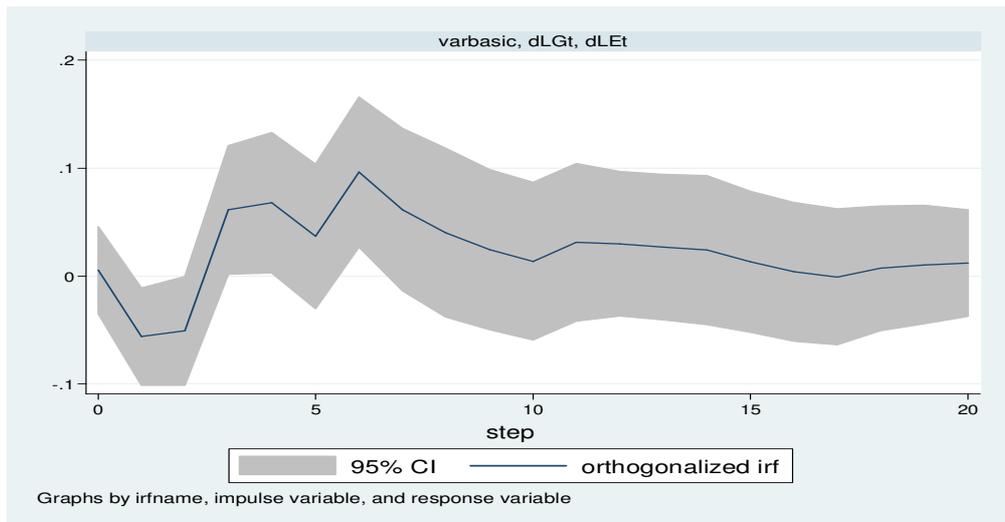
**Figure 2: reaction of per capita GDP to government expenditures shocks**

**Source: research findings**



**Figure 3: reaction of real per capita personal consumption to government expenditures shocks**

**Source: research findings**

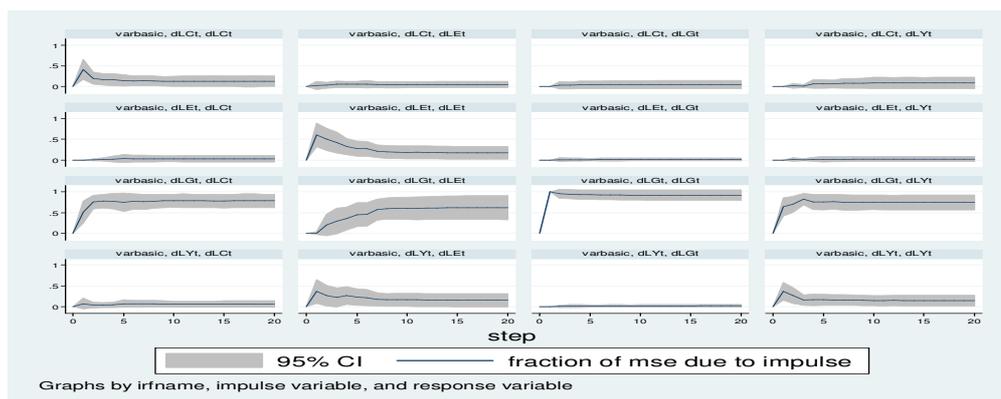


**Figure 4: reaction of real exchange rate to government expenditures shocks**

**Source: research findings**

### **5.6 Forecast error variance decomposition**

We study share of any exogenous variables in entered shocks on endogenous variables using forecast error variance decomposition. Figure 5 presents results of variance decomposition. In this figure we study share of government expenditures shocks as an exogenous variable on vitality of macroeconomic variables as dependent variables. Government expenditures shocks have most shares in explain government expenditures, personal consumption, GDP and real exchange rate and other variables shocks have little share in explain of vitality.



**Figure 5: results of variance decomposition**

**Source: research findings**

## 6. CONCLUSION

Positive shocks of government expenditures increase national income. It had second impact by increasing households would to personal consumption. If this surplus demands don't cover inside of country led to more demand for import goods from the outside of country and decrease economic growth but in the other side those shocks increase export goods, improve trade balance and increase economic growth by increasing effective exchange rate. Positive shock of government expenditures is an important factor to increase GDP and improve economic growth. If would to personal consumption cover by inside of country improve trade balance and increase economic growth, and if would to consume foreign goods be more than domestic goods worsen trade balance and decrease economic growth. Our finding that government spending shocks raise output and consumption is consistent with previous studies that have used identification assumptions and estimation techniques similar to those we employ in the present paper (Rotemberg and Woodford, 1989; Blanchard and Perotti, 2002; Fata's and Mihov, 2001; Perotti, 2004, 2007; Galí et al. 2007).

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