

# **Informal Employment under Different Shocks in Dynamic Stochastic General Equilibrium Model of Iran's Economy**

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## **Abstract**

This paper incorporates dual labor market in a New-Keynesian model for Iran's economy to survey how informal employment reacts when different shocks hit economy. The substantial share of informal employment in Iran, on the one hand and the growing use of dynamic stochastic general equilibrium models in analyzing economic policies by central banks and in eliminating the flaws of these models, on the other hand, make it necessary to design a dynamic stochastic general equilibrium model with dual labor market based on Iran's economic features. To do so, in this study, besides dividing labor market into formal and informal sectors, firms have also been classified according to the type of the production function and labor hiring.

The outcomes revealed that this model can describe the data of Iran's economy in some point and also is aligned with accepted operation of the DSGE models in past studies.

The impulse responses to shocks are theoretically sound. As common in the literature informal employment plays role as a buffer in walrasian labor market and the money shock has no real effect without rigidities.

**Keywords:** dual labor market, formal employment, informal employment, Dynamic Stochastic General Equilibrium Models

**JEL Classification numbers:** E19, J42, E29.

## **1-Introduction**

After Lucas Critique (1976), DSGE or Dynamic Stochastic General Equilibrium models raised and employed widely as the work horse for the core bankers and policy makers in order to study the effects of various scenarios. The Real Business Cycles (RBC) is the first generation of DSGE models developed based on micro foundations such as inter temporal optimization came from infinitely lived, totally rational agents and price flexibility. The New Keynesian (NK) Dynamic Stochastic General models of equilibrium differ from RBC in

considering not efficient competition in labor and product market as well as staggered wages and prices to explain involuntary unemployment and the impact on monetary shocks on real variables.

Besides these models have been successful in replicating the business cycles features of developed economies, some of the developing economies features need to be embedded in their economic models for meaningful policy implications. Some of the common features of developing economies which differentiated them from developed countries include:

Existence a large informal sector, small open economies vulnerable to external shocks, weak financial sectors, weak economic and political institutions.(Ahmad, et.al. 2012)

Due to this is assumed as the first try to incorporating labor market in DSGE model of oil producing economy like Iran, we are classifying the content of the informal employment.

For the most part, however, these general equilibrium models have been applied to advanced economies while the case of developing economies has been mainly addressed in partial equilibrium framework. Modeling of DSGE in emerging economies brings some issues. Because of the lack of homogeneous labor market according to hiring workers and wage setting, segmented labor market has been more considered in the studies of developing countries.

Batini et al.(2011) provided model of DSGE for the economy in India, informally inside the labor market with existence of credit obstacles. Moreover, they introduced frictions of labor market in formal section according to Zenou(2008). The outcomes demonstrated that informal inclusion and frictions of credit enhanced the overall fit of model.

Mattesini and Rossi (2010) studied the policy related to monetary inside the dual economy in New Keynesian framework along with the competitive and informal sector and the formal or unionized sector. They noted that the output level is related to size of these two sectors.

Castillo and Montoro(2008) have modeled the economy by providing friction of labor market and explaining informal and formal contracts of labor and studied the interaction among these two sectors and policy of monetary. This research will support the concept of informal labor market which is assumed as a buffer for economy.

Zenou(2008) developed a dual labor market in which the formal labor market is characterized by search frictions and the informal labor market is competitive. Then different policies were analyzed. The results shown the declined advantages of unemployment and also the cost of entry inside the formal sector include more formal employment and job creation and decreasing the informal sector size. The employment or wage subsidy will rise the informal sector size and the second one will decrease it.

Ahmad et.al (2012) developed a closed economy DSGE model of Pakistan with informality both in labor and product markets with wage and price flexibility. They considered exogenous shocks of technology, fiscal spending and nominal interest rate in the model. This research shows enough amount of proof that large degree of private investment exists

because of government spending increase and also some spillover impacts inside the informal sector because of low level of intensity hint in its probable role of absorbing in level of being sustenance. The responses which are impulse and their functions show very correct theoretically and empirical sound outcomes.

This paper is in line with Ahmad et.al (2012) because of informality in labor and product market and departs including oil sector which finances government spending and the randomness of oil revenue and the money growth rate shock.

The paper proceeds as follows. The informal employment in Iran has been measured in section 2. Section 3 introduces the model. Section 4 presents the model calibration and assessing it. Section5 turns to analyzing impulse responses to shocks. Section 6 concludes.

## **2- Informal Employment in Iran**

Employment in informal sector and informal employment are two different concepts that can be used instead of each other in some occasions. Employment in informal sector includes the employees in unregistered enterprises who are operating in non agricultural fields or the enterprises that the number of their employees is less than a certain amount. This definition of informality is related to the nature of the enterprise. In 2003 another definition was suggested according to nature of job and type of the enterprise.

The definition of different informal employments which was suggested in international work organization report of 17<sup>th</sup> international work symposium in 2003 is as below:

- The workers who are working by their own investment and the employers that have personal informal enterprise as well as relative employees who are working in formal or informal sectors.
- Workers who have informal jobs in formal or informal sectors or are being employed by the families.
- The members of manufacturing cooperation
- The individuals who produce the final products for their own family consumption by their investment
- Employment in informal sectors
- Informal employment outside the informal sector
- Informal employment and employment in informal economy

- The relative employees do not have the registered contracts so they are not included in social and governmental coverage and as a result all of them are assumed as the informal jobs.
- According to the 17<sup>th</sup> symposium, the workers who have informal jobs are excluded from rules of employment, taxes and the unemployment payments.

Because of the fact that there is not enough access to all of the related statistics from above table, it is necessary to design the substitute indicators for calculating the informal employment, by means of available statistics in each country.

Based on the tables from Iran's statistic center, the employment condition of individuals is grouped in three categories as private sector, paid sector and public sector. The private employees are consisted from employers, independent employees, paid people and relative employees with no payment. According to the above table we can calculate the informal employment with three different approaches.

**First approach:** with deducting the employees from enterprises with 5 or more employee we can calculate the informal employment. Based on this, the amount of informal employees from 33.6% in 1996 increased to 35.3% in 2006.

**Second approach:** the number of self employments including employers, dependent workers and the relative workers will be considered as the informal employment. According to this approach the informal employment raised from 36.6 to 38.7.

**Third approach:** for having more accurate calculations, by considering the fact that the paid employees of public sector related to formal employment and independent employees, paid individuals, relative families with no payment are categorized as informal employment it is crucial to define the number of informal employees among employers and paid individuals of the private sector. Regarding to this fact, by means of workshop statistics, all of the employment (both employment and paid employment) the workshops with less than 5 employees as the informal employment and employment of workshops with more than 5 employees as the formal employment will be considered. Therefore, we will obtain the amount of informal employment from the workshop statistics and will use it in population statistics in order to define the number of informal employees in category of employers of the private sector. According to this approach the informal employment increased from 44.9% in 1996 to 47.9% in 2006.

In this study, the informal employment is calculated according to the third approach and the active population distribution is defined based on employment situation and also the gender in 1 and 2 tables.

**Table1: Distribution of employed population based on type of employment**

Employment	1986		1996		2006		2011	
	number	percent	number	percent	number	percent	number	percent
Informal employee	6114	56.0	7389	50.7	10050	49.1	10786	52.5
Formal employee	4888	44.0	7183	49.3	10426	50.9	9761	47.5
Total employee	11002	-	14572	-	20476	-	20547	-

Reference: Results of Research

The method of employee distribution in Table 1 reveals that there was a decline of informal employees from 1986 to 2006. Even though the first and second development programs were not successful in obtaining the employment objectives but after the war was over, using the potentials in economy, increasing investment and economical growth and also having more employees in governmental sector, led to the enhancement of working in formal sector. Therefore the unemployment rate declined from 14.2% in 1986 to 9.1% in 1996. But it should be noted that some amount of decrease in unemployment rate is due to increase of population in 10 years and more which was the result of increased births from 1976 to 1986.

The rule of learning technical and professional abilities for employment, rule of establishing job council, special credits and facilities of employment such as giving withholding facilities, allocating managed funds and the fund for protecting job opportunities are showing the concentration of third program on employment. Government besides the facilities for employment, also considered the credits and facilities which indirectly impact the employment such as credits and exemptions of undeveloped areas and predicted general credits for investment of governmental organizations. For motivating the employers to recruit new work force (such as exemption of employer share for paying work force's insurance for three years and giving 30 million interest free loans with 4% wage in 5 years) for the employers that are recruiting through employment service centers from ministry of labor and social affairs. Hence, the number of informal employees from 1986 to 2006 decreased from 56% to 49.1% and unemployment rate declined from 14.2% to 11.2%.

In year 1386 giving the facilities to small and early return plans, giving facilities form saving currency accounts and increase of demand for work force from one side and increase of students and decrease of employed population and cooperation rate led to decrease of unemployment rate. But limitations of giving facilities because of large amount of none current receivables of the banks due to decline of oil price and implementing the restrictive policy for inhibition of inflation by the government, decrease of investment rate and not having foreign investment because of global economic recession and drought in 2008 were the factors which limited the development of new job opportunities and increased the unemployment rate as well as informal employees. Also limitation of issuing employment license in governmental sector equal to half of the retired people on one side and decrease of

granted facilities from the other side decreased the formal employment and increased the informal employment. So that unemployment rate increased from 11.2% in 2006 to 12.3% in 2011 and the amount of informal employees increased from 49.1% in 2006 to 52.2% in 2011.

**Table2- Employment according to female and male**

year	employment	male		female	
		number	percent	number	percent
1986	informal	5614	92.0	500	8.0
	formal	4404	90.0	484	10.0
1996	informal	6527	88.0	862	12.0
	formal	6279	87.0	904	13.0
2006	informal	8876	88.3	1174	11.6
	formal	8819	84.6	1608	15.4
2011	informal	9601	89	1185	11
	formal	8234	84	1527	16

Reference: Results of Research

The distribution of employees based on the type of job and gender, demonstrates the increase of women contribution among formal and informal employees which mainly is the result of advancement of educational level of women and improvement of society perspective about presence of women in social activities. While the women contribution among informal employees increased from 8% in 1996 to 11% in 2011, the rates were more intense among formal employees and increased from 10% to 16%.

### 3- Model

There are three economic agents in the model: household, firm, government as fiscal and monetary authority, behaves in a closed economy which is only related to abroad through oil sales. It is assumed all the oil produced exported and the oil revenue finances the government expenditures. There are two types of firms: formal and informal. These firms also classified to intermediate and final good producing firms. Intermediate good producer sell their good to final good producers in a monopolistic competitive market and final good producers are only as retailers and sell the final good in a perfectly competitive market. Households derive utility from leisure, consumption and real money balances. They also supply labor and rent capital to firms. Each household has a composite of formal and informal labor. The formal labor is further divided into "r" different types. The production functions are different in formal and informal sectors. However labor is the only input used in informal production function of intermediate good, the formal firms demand labor and capital. Government finances its consumptions through household lump-sum tax, oil income and printing money. There are four shocks in the model: technology shock, government spending shock, growth rate of money shock and oil income shock.

## 2-1- The Household

Following Ahmad et.al (2012) the utility function of the representative household consist of consumption ( $C_t$ ), real money balances ( $\frac{M_t}{P_t}$ ) and leisure ( $1 - L_t$ ). The life time expected utility function of the representative household is:

$$U_t = \sum_{t=0}^{\infty} \beta^t \left( \ln C_t + \phi \ln \frac{M_t}{P_t} - \frac{L_t^{1+\phi_1}}{1+\phi_1} \right) \quad (1)$$

Where, ( $\beta$ ) is the discount factor, ( $\phi$ ) is the preference parameter on money holding. It should be pointed that in this study unlike Ahmad et.al (2012), ( $L_t$ ) is the extensive margin of labor (the number of employees). The aggregate labor of household is the composite of formal and informal:

$$L_t = \left[ \sigma^{-\vartheta} (L_t^f)^{\vartheta+1} + (1-\sigma)^{-\vartheta} (L_t^i)^{\vartheta+1} \right]^{\frac{1}{\vartheta+1}} \quad (2)$$

And aggregate wage can be expressed as:

$$W_t = \left[ \sigma (W_t^f)^{\frac{\vartheta}{\vartheta+1}} + (1-\sigma) (W_t^i)^{\frac{\vartheta}{\vartheta+1}} \right]^{\frac{1+\vartheta}{\vartheta}} \quad (3)$$

Where, ( $L_t^f$ ), ( $L_t^i$ ) represent formal and informal division of household labor and ( $\vartheta$ ) is the inverse of elasticity of substitution between formal and informal labor. Household labor supply for formal and informal are:

$$L_t^f = \sigma \left( \frac{w_t^f}{w_t} \right)^{\frac{1}{\vartheta}} L_t \quad (4)$$

$$L_t^i = (1 - \sigma) \left( \frac{w_t^i}{w_t} \right)^{\frac{1}{\vartheta}} L_t \quad (5)$$

Also aggregate formal wage and aggregate formal labor might have the below formats:

$$L_t^f = \left[ \int_0^{\sigma} (L_t^f(r))^{\rho_w - 1 / \rho_w} d_r \right]^{\rho_w / (1 - \rho_w)} \quad (6)$$

$$w_t^f = \left[ \int_0^{\sigma} (w_t^f(r))^{\rho_w - 1} d_r \right]^{\frac{1}{\rho_w - 1}} \quad (7)$$

In this paper, as Ahmad et.al (2012), it is assumed households have market power to set their wage according to their skill, this causes to following maximization:

$$MAX \quad w_t^f(r) L_t^f(r) - w_t^f L_t^f(r) \quad (8)$$

This leads to:

$$w_t^f(r) = \left(\frac{1}{1-\vartheta}\right) w_t^f \quad (9)$$

The household formal and informal consumption basket is composite of formal and informal good as follows:

$$C_t = \left[ \omega^{1/\mu} (C_t^f)^{\mu-1/\mu} + (1-\omega)^{1/\mu} (C_t^i)^{\mu-1/\mu} \right]^{\frac{\mu}{\mu-1}} \quad (10)$$

So the formal and the informal consumption are:

$$C_t^f = \omega \left(\frac{p_t^f}{p_t}\right)^{-\mu} C_t \quad (11)$$

$$C_t^i = (1 - \omega) \left(\frac{p_t^i}{p_t}\right)^{-\mu} C_t \quad (12)$$

Where,  $(\mu)$  and  $(\omega)$  are the elasticity of substitution between formal and informal consumption and the share of formal consumption of aggregate consumption respectively. Therefore the general price level can be written as:

$$P_t^{1-\mu} = \omega (p_t^f)^{1-\mu} + (1 - \omega) (p_t^i)^{1-\mu} \quad (13)$$

The household budget constraint is as follow:

$$C_t + i_t + \frac{M_t}{P_t} \leq r_t k_t + w_t L_t + \frac{M_{t-1}}{P_t} + \frac{D_t}{P_t} - \frac{TA_t}{P_t} \quad (14)$$

Where,  $(i_t)$  represent investment,  $(w_t)$  nominal wage rate,  $(r_t)$  rent of capital,  $(k_t)$  capital,  $(D_t)$  dividend profits from firms and  $(TA_t)$  lump-sum tax, respectively. Investment increases the capital stock according to:

$$K_{t+1} = (1 - \delta)K_t + i_t \quad (15)$$

Where,  $(\delta)$  is the depreciation rate of capital. Household chooses  $(C_t, i_t, m_t, k_t, L_t)$  through utility maximization problem.

## 2-2- Formal Firm Producing Intermediate Good

The representative formal firm uses formal labor and capital to produce an intermediate good, using cobb-douglas production function.

$$y_t^f = A_t (k_t)^\alpha (L_t^f)^{1-\alpha} \quad (16)$$

Where  $(A_t), (k_t), (L_t)$  are exogenous level of technology, formal intermediate product, formal labor and capital, respectively.  $(\alpha)$  is production capital's share. The capital-formal labor ratio resulting of first order conditions of formal firm profit maximization is given by:

$$\frac{L_{j,t}^f}{k_{j,t}} = \frac{1-\alpha}{\alpha} \left( \frac{r_t}{w_t^f} \right) \quad (17)$$

The marginal cost of the firm can be written as:

$$mc_t^f = \frac{1}{A_t} (\alpha)^{-\alpha} (1-\alpha)^{-(1-\alpha)} (w_t^f)^{1-\alpha} (r_t)^\alpha \quad (18)$$

### 2-3-Informal Firm Producing Intermediate Good

The representative informal firm uses only informal labor to produce intermediate good. The production function of the firm is given as:

$$y_t^i = \gamma L_t^i \quad (19)$$

Where ( $\gamma$ ) is the informal labor productivity. The informal firm hires worker through walrasian informal labor market and their wage set by:

$$w_t^i = \gamma \frac{P_t^i}{P_t} \quad (20)$$

### 2-4- Final Good Producing Firms

Each final good producer firm purchase intermediate goods repackage them as Dixit - Stieglitz aggregator and sell in perfectly competitive market. Where,  $(y_t^f, y_t^i)$ ,  $(y_{j,t}^f, y_{m,t}^i)$ ,  $(\tau)$  and  $(\theta)$  are final good, intermediate good, elasticity of substitution between formal intermediate goods and elasticity of substitution between informal intermediate goods respectively and "f" indicates formal and "i" indicates informal.

$$y_t^f = \left[ \int_0^1 (y_{j,t}^f)^{\tau-1/\tau} d_j \right]^{\tau/\tau-1} \quad (21)$$

$$y_t^i = \left[ \int_0^1 (y_{m,t}^i)^{\theta-1/\theta} d_j \right]^{\theta/\theta-1} \quad (22)$$

The final good producer profit maximization for formal and informal firm respectively given implies the demand function of intermediate good as follows:

$$y_{j,t}^f = \left[ \frac{P_{j,t}^f}{P_t} \right]^{-\tau} y_t^f \quad (23)$$

$$y_{m,t}^i = \left[ \frac{P_{m,t}^i}{P_t} \right]^{-\theta} y_t^i \quad (24)$$

### 2-5-Fiscal and Monetary Authority

Iran is considered as a country which produces oil and is an OPEC member that takes the price so the quotes of production are provided. It is assumed oil produced, sold abroad and the oil revenues will be deposited to government treasury. Therefore oil income follows AR (1) process.

$$\ln(or)_t = \rho_o \ln(or)_{t-1} + \varepsilon_{or,t} \quad (25)$$

As mentioned before, government finances its expenditures through lump-sum tax, oil income and printing money. The real government budget constraint can be written as:

$$ta_t + or_t + m_t - m_{t-1} = g_t \quad (26)$$

Where  $(g_t)$  also follows AR (1) process as:

$$\ln(g)_t = \rho_g \ln(g)_{t-1} + \varepsilon_{g,t} \quad (27)$$

Also, following Ireland (2001) the gross money growth rate  $(\eta_t)$  is:

$$\eta_t = \frac{M_t}{M_{t-1}} \quad (28)$$

Besides the money growth rate changes which considered by monetary authority independently, the inevitable relationship between volatility of money growth rate and volatility of oil revenue will create in oil producing country when petrodollars exchanged to national currency. Since the interest rate is discretionary determined in Iran's economy, instead of Taylor rule, the money growth rate is defined as follows:

$$\eta_t = \rho_\eta \eta_{t-1} + (1 - \rho_\eta) \bar{\eta} + \omega_{or} \varepsilon_{or} + \varepsilon_\eta \quad (29)$$

Where,  $(\bar{\eta})$ ,  $(\omega_{or})$ ,  $(\varepsilon_{or})$  and  $(\varepsilon_\eta)$  are money growth rate in steady state, parameter defines the effect of oil revenue shock on money growth rate, oil revenue shock and money growth rate shock, respectively.

## 2-7 Market Clearing Conditions

The economy resource constraint implies that:

$$y_t^f + y_t^i + or_t = c_t^f + c_t^i + g_t + i_t \quad (30)$$

Also, given that  $(ls_t^f)$ ,  $(ld_t^f)$ ,  $(ld_t^i)$ ,  $(ld_t^i)$  and  $(u_t)$  are formal labor supply, formal labor demand, informal labor supply and informal labor demand and unemployment, clearing conditions for formal and informal labor markets given by:

$$ls_t^f = ld_t^f \quad (31)$$

$$ld_t^i = ls_t^i \quad (32)$$

## 3 Calibrations

After the log linearization of the necessary equilibrium conditions around the steady state, the parameters have been calibrated which summarized in table 3. The parameters describing shock processes are estimated following King and Rebelo (2000) via the annual data

published by Central Bank of Iran during 1974-2010. Table 4 presents persistence of shocks and the standard deviations.

**Table3- The Structural Parameters**

Parameter Description	Value	Reference
Discount Factor	0.98	Kavand & Ferris(2011)
Depreciation Rate	0.048	Kavand & Ferris(2011)
Share of Capital	0.412	Kavand & Ferris(2011)
Share of Formal Consumption of Total Consumption	0.55	Ahmad et.al(2012)
Elasticity of substitution between Formal and Informal employment	2	Ahmad et.al(2012)
Wage rigidity parameter	0.32	Casares(2010)
Elasticity of Substitution of intermediate goods	4.33	Kavand & Ferris(2011)
Steady state of inflation	1.12	
Elasticity of substitution between formal and informal consumption	0.7	Ahmad et.al(2012)

**Table 4- Shock Process parameters**

parameters	Value
Persistence of technology shock (SD of technology shock)	0.72 (0.019)
Persistence of government spending shock (SD of government spending shock)	0.66 (0.074)
Persistence of oil revenue shock (SD of oil revenue shock)	0.69 (0.018)
Persistence of money growth rate shock (SD of money growth rate shock)	0.037 (0.08)

Reference: Results of research

It is common to the literature to assessing the simulation performance of the DSGE model, the moments of the data (after employing filter of hodrick prescot) from those generated by the model compared which has done and presented in table 5.

**Table 5- Simulation and Real Data Comparison**

Variable	Consumption	Investment	Capital	Output
Standard Deviation of Real Variable	0.03	0.17	0.02	0.05
Standard Deviation of Simulated Variable	0.02	0.18	0.04	0.09
Autoregressive coefficient of real variable in lag 1	0.987	0.67	0.98	0.73
Autoregressive coefficient of simulated variable in lag 1	0.99	0.73	0.99	0.78
Autoregressive coefficient of real variable in lag 2	0.82	0.43	0.95	0.84
Autoregressive coefficient of simulated variable in lag 2	0.96	0.50	0.96	0.53

Reference: Results of research

#### 4 Responses to Structural Shocks

After assessing the model performance, the impulse responses function generated to different structural exogenous shocks on the production, investment, formal and informal employment, inflation and unemployment analyzed.

Figure 1 shows the responses to technology shocks. Following one percent positive technology shock, formal production, investment, formal employment increased whereas informal production, informal employment and inflation decreased. The consumption expanded since employment raised the output and also the rise of real wage happened and therefore income of household climbed up. The employment magnitude in both informal and formal labor markets is not large because technology improvement removes the need for having more labor. Because of employment and output increase, inflation expectation will be reduced.

The responses to government spending are shown in figure 2. The formal output increase but crowding out effect caused to private investment decrease, as a result output and employment in the informal sector earlier reduced to the steady state level. In this regard, informal sector is not impacted by crowding the impact due to their process of production will just utilize the

labor. In spite of decreasing in unemployment when one percent positive shock of the government spending hints, over time it will be increased via private investment reduction.

Following to government spending shock, consumption decreases because of inflationary effect of government spending shock, decline in formal output, employment and real wage.

The impact of government spending on output and economic growth is affected by the financing of expenditures on the one hand and on the other its allocation. If they financed by tax and central Bank loans, the crowding out effect on consumption and investment causes to the positive effects of government spending canceled out by negative effect of investment and consumption. In total, government spending is not a long-term positive effect on output and economic growth, but if the increase in government spending is financed by oil revenues crowding out effects of government spending on consumption and investment of the private sector are limited and the government spending makes positive effects in long run.

Figure 3 shows the impulse responses of oil revenue shocks. One percent positive oil revenue shock has temporary effects on the formal and informal output and employment. Following increase in the output and employment, household's income increases and leads to more investment and consumption.

Because of delayed supply response to oil revenue shocks, along increasing demand, inflation occurs. Impact on inflation and the increase in oil revenue consumption affected more than other variables in the model, while the oil revenue shock quantitatively will have a huge impact on inflation. Analyzing Iran's economic growth shows the revenues from the oil boom, has not achieved high and sustained economic growth.

The sharp increase in government spending during the oil boom increases the economy's dependence on government spending and in such circumstances reduction in government spending is to deepen the recession.

As in the literature in DSGE model, without rigidities, the economy is not affected by money growth rate shock. According that, wages are indexed based on previous inflation; formal wage rigidity has been considered as follows:

$$W_t^f = W_{t-1}^f (1 + \pi_{t-1})^{\varphi_w} \quad (33)$$

The response of the model to positive money growth rate shock in the presence of wage rigidity has been shown in figure 4.

Increase in the money growth rate due to rigidities will be followed by real effects. It can create an artificial and temporary boom in the economy will lead to an increase in inflation in the next period on the one hand and the economic recession on the other hand which implies the stagflation. The causes of rescission are gradual increase in consumption and reduction in investment resources of households. So because of the fact that money growth does not lead to proportional investment, it follows inflationary consequences. The rate of money growth is in Iran's economy as the most important financial variables. It on the one hand very high and

the other side has a lot of instability. While the rate of money growth volatility causes the volatility of inflation, it has been one of the major causes of economic growth instability.

## **5 Conclusions**

In this paper a dynamic stochastic general equilibrium model has been developed based on dual labor market in which firms are divided to formal and informal according to types of labor hired and production function specification kind, and employment is classified in formal and informal depending on whether or not having legal protections. In order to design a model is in accordance with Iran's economy, the oil revenue and the government dependence to it has been considered.

The outcomes revealed that this model can describe the Iran's economy data in some point and also is aligned with accepted operation for the DSGE models in past studies.

The impulse responses to shocks are theoretically sound. As common in the literature the informal employment in Iran plays role as a buffer in walrasian labor market. Also, the money shock has no real effects when the prices and wages are flexible.

Technological shock decreases the formal employment but other shocks increase it. However informal employment decreases at first, it gradually increases in subsequent periods. But oil revenue, government spending and money growth rate shocks follow informal employment increase because of lack of funding sources for investment and gradual increasing in consumption.

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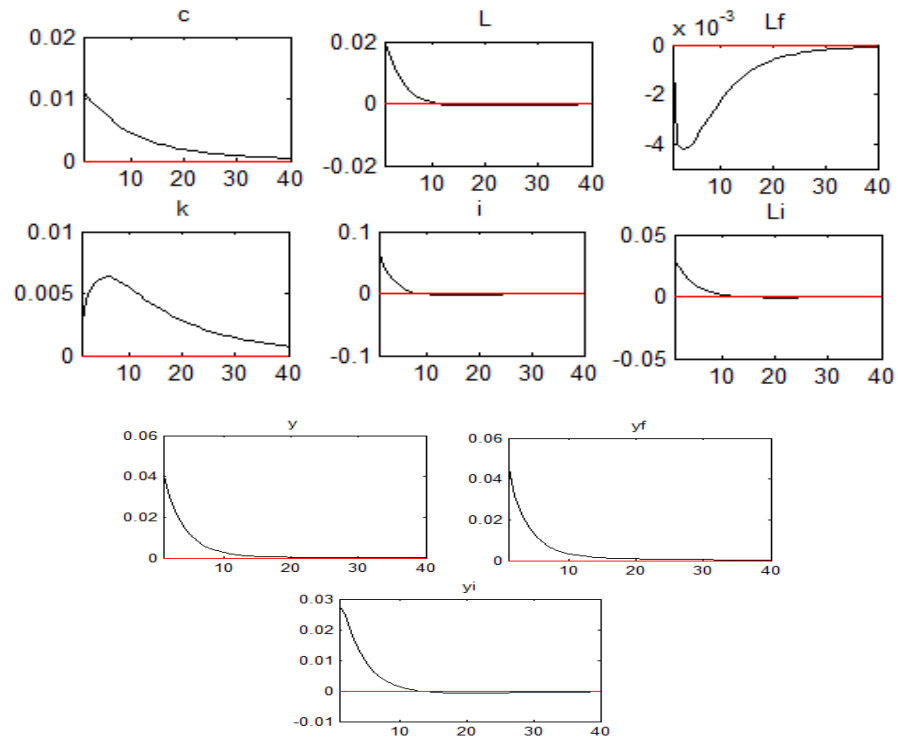
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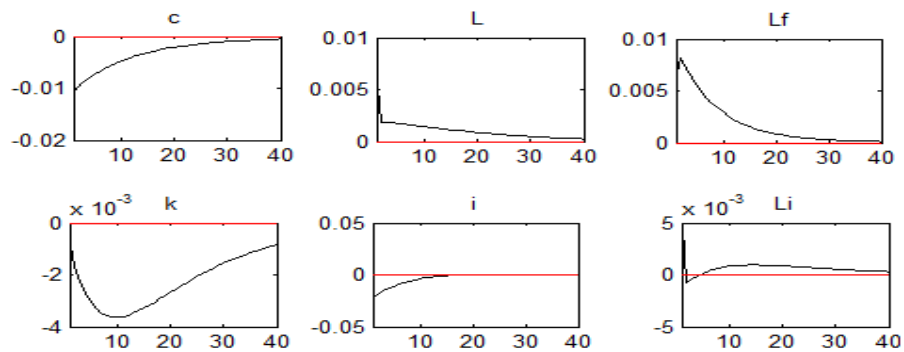
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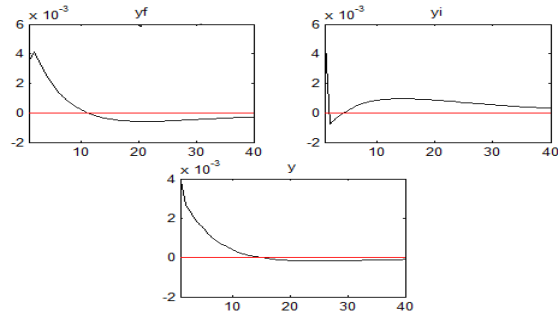
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**Figure 1- The impulse responses to technology shocks**

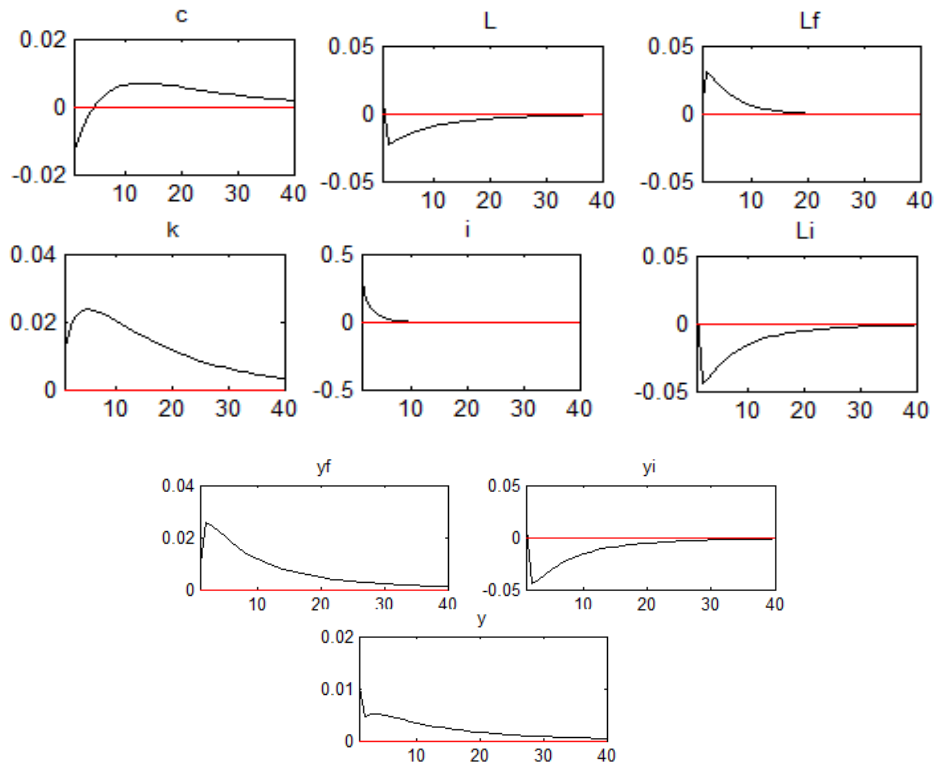


**Figure 2- The Impulse Responses to Government Expenditure Shocks**





**Figure 3- The Impulse Responses to Oil Revenue Shocks**



**Figure 4- The Impulse Responses to Money Growth Rate Shocks**

