The effects of labor wage tax reform on the Iran economy: A computable general equilibrium model approach

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Government revenue in Iran is highly dependent on the oil sales. Iranian government in order to decrease dependence on oil sales should obtain new income resources by expanding the tax base. Labor wage tax is not considered an important source of government revenue. Thus increasing tax rate on labor wage is necessary for government revenue. This paper attempts to develop and use computable general equilibrium model to examine the economic impacts of increasing labor wage tax in industrial and mining sector on the Iran economy. It contacted three simulations to examine the consequences of possible changes that occur in Iran economy due the increase in labor wage taxes. The policy issues addressed in this paper are 5, 10 and 15% increase in labor wage tax in industry and mining sectors. The increase of the labor wage tax rate may cause Iran's gross domestic product (GDP) and household income to decline from the benchmark level while the government revenue would increase. Also the sectoral effects are discussed in this paper.

Key words: Labor wage tax, computable general equilibrium, Social Accounting Matrix.

INTRODUCTION

Resource allocation, income distribution, economic growth and economic stability are all responsibilities of governments. To fund these duties, government must draw a variety of revenue sources. In many developed countries most of the government’s revenue comes from taxes. In contrast, government revenue in Iran is highly dependent on the production and export of crude oil, and is consequently vulnerable to fluctuations in international oil prices. The Iranian government cannot indefinitely use oil revenues to reform the economic structure. Iran's economic experience in recent decades has shown that continuation of using oil revenue to make an increase in liquidity will cause inflation in the national economy. Following the guidelines of the Third Socio-economic and Cultural Development Plan to decrease dependence on oil sales, taxes are being increased to make up a larger portion of the Iranian government’s revenues. The Fifth Development Plan of Iran anticipates that the government budget will be fully finance by taxes and that the taxes-to-GDP ratio will be ten percent.

In recent years, the Iranian government has experienced budget deficits, making it increasing difficult to finance public services. To achieve the aforementioned objectives of the Fifth Development Plan and to reduce budget deficits, the Iran Tax Organization can obtain new income resources by expanding the tax base. Unlike developed countries, labor wage tax in Iran makes up only 14% of total government tax revenues, while income tax on businesses contributes 48%. Thus, labor wage tax is not considered an important source of government revenue. Besides the collection function, the tax on labor wage can have many other important functions: It allows for an allocation of economic resources without distorting relative prices; it can be an important tool for income redistribution through progressive brackets (Wasilewski, 2005).

For these reasons, increasing tax rate on labor wage is necessary for Iran economy. However, increasing tax rates on labor wage can affect labor work effort and can influence the aggregate labor supply, government revenue and expenditure, output of the economy and other economic variables. It is important to be able to
estimate the economic effect of taxes reform so that policy-makers can make better informed judgments about policy proposals. There are two ways to estimate the economic effects of policies: partial equilibrium and general equilibrium analysis. The selection of a computable general equilibrium (CGE) is useful for evaluating tax policies changes because it captures the full impact of tax change on the economy. Therefore, this paper attempts to develop and use computable general equilibrium model to examine the economic impacts of increasing labor wage tax in industrial sector on the Iran economy.

IRANIAN'S TAX SYSTEM COMPARED TO OTHER COUNTRIES

Total tax revenue relative to GDP is one of the important indicators for understanding the role of tax revenues. Table 1 gives this ratio for Iran economy. This ratio is 7.3, 6.8 and 7% in the years 2005, 2006 and 2007, respectively. This index virtually has been unchanged in Iran's economy. This ratio for 2005 is 26.8, 33.5, 30 and 49.7% in the United State, Canada, Switzerland and Denmark, respectively. In developing countries like South Korea, Turkey, South Africa and Czech Republic, the ratio in 2005 is 15.8, 32.3, 25.8 and 38.5, respectively. Given this data, Iran's ratio appears quite small. Table 2 shows the financial structure of Iranian government revenue.

In recent years, the tax collection in Iran has been increased and the share of oil revenue has been declined. Because, the tax to GDP ratio was almost constant from 2005 to 2007, authorities have not been successful to expand the tax base. The share of indirect and direct taxes from total tax revenue for Iran has been given in Table 3. Share of enterpriser income tax is the highest amount and it has remained constant. The trend of labor wage tax has increase.

In developed country, most of the government's income comes from labor wage tax. The labor wage tax to GDP ratio in 2001 is 12.2, 13.3, 9.8 and 26.3% in the US, Canada, Switzerland and Denmark, respectively. In developing countries like South Korea, Turkey and Czech Republic, the ratio in 2001 is 3.8, 7.7 and 4.8, respectively. This ratio for Iran is 0.83, 0.87 and 0.9% in the years 2005, 2006 and 2007, respectively. With regard to this data, it is observed that Iranian authorities can increase and expand the labor wage tax base to obtain new revenue resources. The structure of labor wage tax in Iran is progressive, with tax rate ranging from 10 to 35%, in 5 brackets.

LITERATURE REVIEW

Multisectoral models (MMs) have increasingly become popular in applied economics since the input-output (I-O) model was developed by Leontief (1936). In general, MMs are based on general equilibrium (GE) theory and capture the interaction between commodity and factor markets and decision making agents in an economy. General equilibrium broadly refers to the Walrasian competitive model in which all economic agents are price takers who maximize profits or utility, and prices freely adjust to equilibrium to clear markets.

The analytical goal of general equilibrium model is to determine a vector of prices for both consumers and producers of goods and services that will clear all markets. The optimal allocation of resources is determined by equilibrium prices, given endowments of labor and capital (Dervis et al., 1981). CGE analysis has progressed quite rapidly since the pioneering work of Johansen (1960). In this multisectoral study, Johansen applied the general equilibrium model to the Norwegian economy. Johansen (1960) reduced the highly linear model to a class of log-linear equations and then solved it by matrix inversion.

In addition to Johansen's method of linearizing the CGE model and solving it by simple matrix inversion, there are other solution techniques in the literature to execute the CGE models. First, based on the fixed-point algorithm pioneered by Scarf Herbert (1973), a CGE model can be solved by finding a fixed point in a mapping of prices to prices through excess demand equations. Secondly, the solution of CGE model can be formulated by finding the shadow prices that can be interpreted as market price. Finally, it is possible to treat a CGE model as a system of non-linear algebraic equations directly solved by different numerical techniques. In the late 1970s, CGE modeling was directed toward analyzing income distribution issues of developing countries.

The Adelman-Robinson model of Korea is the first effort to examine the distribution of income in a CGE setting (Adelman and Robinson, 1978). This model focuses on the distribution of income among the various socioeconomic groups. Dervis, de Melo and Robinson's "General Equilibrium Models for Development Policy" (1981) is a major contribution to the CGE theory for developing countries. In this work, the authors discuss how distributional phenomena can be included in the CGE models for developing countries, and also how international trade in a multisectoral setting can be treated within a CGE framework. The main significance of this work comes from addressing the issue of incorporating trade and international capital flows to the development policy in developing economies.

The study of tax incidence analysis using computable general equilibrium approach was pioneered by Harberger (1959, 1962). Harberger model is two factors, two sectors, general equilibrium model in which a tax applies to the use of one factor (capital) in one sector. Arnold Harberger solved his model using a series of approximations and local linearization assumption. Shoven and Whalley (1972, 1973) were the first to analyze
Table 1. Share of Taxes in GDP.

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax revenue</th>
<th>GDP</th>
<th>GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>134,574</td>
<td>1,831,737</td>
<td>7.3</td>
</tr>
<tr>
<td>2006</td>
<td>151,621</td>
<td>2,224,093</td>
<td>6.8</td>
</tr>
<tr>
<td>2007</td>
<td>191,815</td>
<td>2,882,236</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Website of Iran Central Bank, the value of numbers is milliard Rial, Iran currency.

Table 2. Financial structure of Iran government revenue.

<table>
<thead>
<tr>
<th>Source of revenue</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>%</td>
<td>Revenue</td>
</tr>
<tr>
<td>Oil</td>
<td>186,342</td>
<td>48</td>
<td>181,881</td>
</tr>
<tr>
<td>Tax</td>
<td>134,574</td>
<td>35</td>
<td>151,621</td>
</tr>
<tr>
<td>Other</td>
<td>66,753</td>
<td>17</td>
<td>80,426</td>
</tr>
<tr>
<td>Total</td>
<td>387,669</td>
<td>100</td>
<td>413,928</td>
</tr>
</tbody>
</table>

Source: Website of Iran Central Bank, the value of numbers is milliard Rial, Iran currency.

Table 3. Share of taxes in total tax revenue.

<table>
<thead>
<tr>
<th>Source of revenue</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>%</td>
<td>Revenue</td>
</tr>
<tr>
<td>Enterpriser income tax</td>
<td>64,460</td>
<td>48</td>
<td>72,362</td>
</tr>
<tr>
<td>Labor wage tax</td>
<td>15,254</td>
<td>11</td>
<td>19,451</td>
</tr>
<tr>
<td>Wealth tax</td>
<td>4,316</td>
<td>3</td>
<td>5,378</td>
</tr>
<tr>
<td>Tariff</td>
<td>35,954</td>
<td>27</td>
<td>39,806</td>
</tr>
<tr>
<td>Consumption tax</td>
<td>14,591</td>
<td>11</td>
<td>14,123</td>
</tr>
<tr>
<td>Total</td>
<td>134,574</td>
<td>100</td>
<td>151,621</td>
</tr>
</tbody>
</table>

Source: Website of Iran Central Bank, the value of numbers is milliard Rial, Iran currency.

taxes using full general equilibrium computational procedure. In their 1972 paper, an artificial commodity is used to incorporate the tax distortions, which effectively limits the applicability of the analysis to one tax at a time. In 1973, they developed a procedure to deal with several simultaneous tax distortions without using artificial commodities. Scarf’s algorithm enables the existence of tax equilibrium to be shown and also provides a method through which such equilibria can be computed. Two models closely related to the Shoven-Whalley work are those by Piggott (1980) on Australia and Serra-Puche (1984) on Mexico.

Piggott’s model differs from the other tax models in using two stage constant elasticity of substitution (CES) production functions with differing types of capital and labor. Tax policy reforms in developing country have recently received attention by economic researchers. For example, Cordano and Balistreri (2010) used CGE model for estimating the Marginal Cost of Public Funds (MCPF) for Peru. Giesecke and Hoang Nhi (2010) evaluated the value-added tax systems in Philippine by using a dynamic CGE model. Ulussever (2011) extended a financial CGE model to explore the consequences of changing the government deficit financing options on macroeconomic variables in the Turkish economy under both fixed and flexible interest rate regimes. As authors know, there is no study about labor tax policy by CGE approach for Iran economy. However, Karami et al. (2011) used CGE model to evaluate the effects of removing food subsidy on Iran economy. Ghadimi (2008) applied a dynamic computable general equilibrium model to examine the issues related to optimal extraction of oil resource for Iran economy.

IRAN COMPUTABLE GENERAL EQUILIBRIUM MODEL

The CGE model used in this study is a standard computable general equilibrium model. Our model follows the work of Dervis et al. (1981); Lofgren et al. (2002). In our model, labor, capital and intermediate inputs are used in the production process. The produced good is then transformed into an export good and a good for the domestic market using a constant elasticity of transformation (CET) equation. On the consumption side, consumers buy composite commodity goods. A constant elasticity of transformation (GET) function is supposed to
describe the allotment of composite goods into import and locally-produced goods (Armington, 1969). The model accepts the "small country" assumption of fixed world prices for imports and exports.

Total savings come from the household, government, enterpriser and foreign sectors. To determine the investment demand by sector of origin, this model makes use of a capital composition matrix describing each sector's unique capital requirements to produce its own capital well. The following is a description of the model and equations. In terms of notation, the subscripts \( i \) and \( j \) refer to sectors and the subscript \( h \) refers to household income groups.

### Producing sector

Production includes two-stage, nested CES production functions. At the top level, outputs \( X \) is CES function of value-added \( V \) and intermediate inputs \( AI \):

\[
X_i = \alpha \left[ \frac{\sigma_i AI_i^{-\sigma_i} + (1 - \sigma_i)V_i^{-\sigma_i}}{\sigma_i PAI_i} \right]^{\frac{1}{1 + \sigma_i}}
\]

\( \alpha_i \) and \( \delta_i \) are shift and share parameters, respectively. The first-order condition (FOC) of optimization of production function is:

\[
\frac{AI_i}{V_i} = \left[ \frac{\sigma_i PV_i}{(1 - \sigma_i)PAI_i} \right]^{\frac{1}{1 + \sigma_i}}
\]

\( PV_i \) is the price of value-added and \( PAI_i \) is the price of intermediate inputs. It is assumed that Intermediate inputs are used with a fixed-coefficient technology (Leontief function) while the value-added are defined as a CES function that lets substitution between capital and labor.

\[
V_i = \beta_i \left[ \frac{\theta_i L_i^{-\theta_i} + (1 - \theta_i)K_i^{-\theta_i}}{\beta_i \theta_i^{\theta_i} P_L_i} \right]^{\frac{1}{\theta_i^{\theta_i}}}
\]

The FOCs of the value-added CES function give Equations (4) and (5).

\[
\frac{L_i}{V_i} = \left[ \frac{\theta_i PV_i}{\beta_i \theta_i^{\theta_i} P_L_i} \right]^{\frac{1}{1 + \theta_i^{\theta_i}}}
\]

\[
\frac{K_i}{V_i} = \left[ \frac{(1 - \theta_i)PV_i}{\beta_i \theta_i^{\theta_i} PK_i} \right]^{\frac{1}{1 + \theta_i^{\theta_i}}}
\]

Based on the fixed-coefficient function, the demand for intermediate goods by sector of origin is defined as follow:

\[
INT_i = \sum_j A_{ij} AI_j
\]

Where the \( A_{ij} \)’s express the input-output coefficients and \( \sum_j A_{ij} = 1 \).

The price of intermediate inputs is equal to weighted average of the price of each composite good \( PC \).

\[
PAI_i = \sum_j A_{ij} PC_j
\]

For each activity, total revenue \( P_iX_i \) net of taxes is fully distributed to the value of intermediate inputs and value-added.

\[
PV_iV_i = P_iX_i(1 - TA_i) - PAI_i AI_i
\]

For labor market clearing, the total labor demand should be equal to total labor supply \( LST \).

\[
\sum_i L_i = LST
\]

The sectoral capital stock \( K_i \) is distributed across sectors in fixed proportions \( KD_i \) of total capital stock in the economy \( KST \). The supply of capital in the economy provides the capital requirements for each section.

\[
\sum_i K_i = KD_i KST
\]

### Household sector

Owners of primary inputs earn income from labor and capital. Labor is owned only by the households. However, capital income \( YK \) is distributed among households, government, enterpriser and foreign sectors in fixed proportions for each sector. Capital income is obtained from the following equation:

\[
YK = \sum_i PK_i K_i
\]

where \( PK \) is the price of capital and \( K \) is the capital stock. \( KH, KGD \) and \( KED \) are the household share, the government share and the enterprisers share in the
capital income, respectively. Total labor income and household capital income are distributed to each household group by the labor income shares (LSD) and capital income shares (KSD). Households pay taxes and insurance to the government. Income tax imposed on households income is given by the following equation:

$$THY_h = (PL_t \sum_i L_i \cdot LSD_h + YK \cdot KH \cdot KSD_h) \cdot THY_h$$

(12)

$THY_h$ represents the average household income tax and life insurance rate. In addition of input income, other sources of income for the households are transfers from the government ($TRG$) and surplus from enterprisers ($YE$) to households and foreign remittances ($TRF$). These transfers are paid as fixed share for each institution.

$$Y_h = (PL_t \sum_i L_i \cdot LSD_E_h + YK \cdot KED_h)(1 - THY_h) + TRG \cdot TRGD_h + TRF \cdot TRFD_h \cdot ER + YE \cdot YE_h$$

(13)

The household savings is a fixed proportion ($SR_h$) of household income.

$$HHS_h = SR_h \cdot Y_h$$

(14)

Other equations are the household expenditure which determines the household demand for composite goods in accordance with a Linear Expenditure System (LES) demand function:

$$C_{ih} = PC_i \cdot CM_{ih} + (A_{ih}(Y_h - SR_h) - \sum_i CM_{ih})$$

(15)

Where $CM_{ih}$ is a fixed, subsistence level of expenditure of good $i$ by household $h$. $A_{ih}$ is the marginal propensity to consume parameter. According to the LES demand Junction, all goods are normal, all pairs of goods are net substitutes and demand is inelastic with respect to its own price. These results are less restrictive than the unitary price and income elasticities of the Cobb-Douglas demand function. The consumption good demanded from each sector is:

$$C_i = \sum_h C_{ih}$$

(16)

**Enterpriser sector**

$TER$ Represents the average enterpriser’s income tax, thus the enterpriser income tax that is pay to government is obtained from the following equation:

$$TEY = TER \cdot YE$$

(17)

The main income earned by enterpriser is capital income. Other sources of income are transfer from the government ($TRG$) and infra-institutional ($YE \cdot YEED$).

$$YE = (PL_t \sum_i L_i \cdot LSD_E_h + YK \cdot KED_h)(1 - TER) + TRG \cdot TRGD + YE \cdot YEED$$

(18)

Enterpriser’s expenditure ($EE$) is payment of enterpriser income tax ($TEY$) and infra-institution transfers to households ($YE \cdot YEHD$) and enterpriser ($YE \cdot YEED$). The rest of the enterpriser income will be saved ($ESAV$).

$$EE = YE \cdot YEHD + YE \cdot YEED + TEY + ESAVE$$

(19)

Total government expenditure ($GTOT$) is exogenous in the model. The Government consumption demand is a fixed proportion (GEP) of the total expenditures:

$$GEP = \sum_h GTOT_h$$

(20)

Government savings ($GSAV$) is equal to government revenue minus government expenditure and transfers to the nongovernmental institution.

$$GSAV = GEP \cdot GTOT$$

(21)

Government savings ($GSAV$) is equal to government revenue minus government expenditures and transfers to the nongovernmental institution.

$$EG = \sum_i PC_i \cdot G_i + \sum_h TRG \cdot TRGD_h + GSAV + TRG \cdot TRGED + TRG \cdot TRGD_R$$

(22)

**Foreign sector**

The model incorporates the small country assumption. The domestic prices of exports and imports (PE and PM)
depend on their respective world prices (WPE and WPM) which are exogenously determined.

\[ PE_i = WPE_i(1 + TE_i)ER \]
\[ PM_i = WPM_i(1 + TM_i)ER \]

where ER, TE and TM is exchange rate, tax on export and tax on import, respectively. The model assumes imperfect substitution between imported and domestically-produced goods. Thus, domestic composite goods purchases \((Q)\) are defined as a CES aggregation of locally-produced goods \((D)\) and imports \((M)\).

\[ Q_i = \theta_2 \left[ \gamma^2 M_i^{-\rho_{M}} + (1 - \gamma^2)D_i^{-\rho_{D}} \right]^{\frac{1}{\rho_{M}}} \]

The FOC gives the relative level of imports to domestically-produced goods.

\[ \frac{M_i}{D_i} = \left[ \frac{\gamma^2 PD_i}{(1-\gamma^2)PM_i} \right]^{\frac{1}{\rho_{M}}} \]

Likewise, it is assumed that production \((X)\) is a CES function of exports \((E)\) and domestic sales \((D)\).

\[ X_i = \theta_1 \left[ \gamma_1 E_i^{-\rho_{E}} + (1-\gamma_1)D_i^{-\rho_{D}} \right]^{\frac{1}{\rho_{E}}} \]

The relative level of exports to domestic sales is, therefore:

\[ \frac{E_i}{D_i} = \left[ \frac{\gamma_1 PD_i}{(1-\gamma_1)PE_i} \right]^{\frac{1}{\rho_{E}}} \]

The average of domestic export price (PE) and domestic goods price (PD) determine price of outputs (PX). Similarly, the price of the composite good (PC) is determined by PD and PM (domestic price of imports).

\[ PX_i = PD_iD_i + PE_iE_i \]
\[ PC_iQ_i = PD_iD_i + PM_iM_i \]

**Closure**

**Investment and savings**

Total saving \((TOTSAV)\) is equal to sum of savings from the household, government, enterpriser and foreign sectors.

\[ TOTSAV = \sum_h HHS + GSAV + ESAV + TKF.ER \]

The components of investment are inventory investment \((INV)\) and capital expenditures \((KDELT)\).

\[ KDELT = TOTSAV - \sum_i INV_i PC_i \]

Inventory investment defines as a fixed proportion \((INVP)\) of each industry's output.

\[ INV_i = INVP_iX_i \]

Capital expenditures by sector of destination are determined by constant shares \((KDELP)\) of capital expenditure.

\[ \sum_j B_{ij} PC_i KDEL_{ij} = KDELP_{ij} \cdot KDELT \]

Capital expenditures by sectors of origin \((IND)\) are defined as following equation:

\[ IND_i = \sum_j B_{ij} PC_i KDELT_{ij} \]

\(B_{ij}\) are the elements of capital composition matrix. The coefficients \(B_{ij}\) denote the proportion of capital good \(i\) in one unit of capital goods produced by sector \(j\).

**Market equilibrium**

Market clearing in the goods market states that supply of composite goods must be equal to demand.

\[ \text{Max} \quad \sum_i Q_i = C_i + INT_i + IND_i + INV_i + G_i \]

**Foreign accounts**

Market equilibrium for foreign sector implies that foreign capital inflow \((TKF)\) must be equal to the difference between the revenue of the foreign sector from imports and its expenditures on exports and transfers to both household and government sectors. In this model, the level of foreign savings is exogenous and the exchange rate is the equilibrating variable which balances the
revenues and expenditures.

\[ TKF = \sum_i WPM_i M_i - \sum_i WPE_i E_i - TRF \]  \hspace{1cm} (37)

**Numeraire**

The price index \( PINDEX \) is a weighted sum of the prices of composite goods and it is fixed at one.

\[ \sum_i \Omega_i P_i = PINDEX \]  \hspace{1cm} (38)

**Solution procedure**

The generalized algebraic modeling system (GAMS) was used to solve the nonlinear equations of Iran CEG model.

**SOCIAL ACCOUNTING MATRIX**

CGE is one of the important methods for analyzing the effects of economic policies. These models according to each country's economic structure are designed and with using I-O table and social accounting matrix (SAM) are quantified and used. A well-established data is necessary for any CGE model to capture the effects of the economics policy.

Input-output table shows all the inter-industry transactions, but it does not the overall picture of the economy. SAM is a balanced matrix which provides a picture of a market economy for a given year. A SAM is the integration of input-output table and national income accounts. It does not only present the inter-industry flows but also includes all the transaction in the economy.

The rows of SAM shows revenue and the columns represent expenditures. The budget constraint, therefore, requires that the row and column sum must be equal. Until now, in Iran four SAM has been codified. Aggregate social accounting matrixes for Iran are presented based on 1999 figures.

This SAM has been developed by central bank of Iran. This SAM includes 53 activities and 112 commodities accounts. The institutions contain households, government, enterprisers and the rest of the world. In this study, in order to facilitate the analysis and interpretations of simulation results, 53 activities accounts are aggregated into five activity accounts including: Agriculture, oil and gas, industry and mining, construction and services. Similar aggregation follows in the commodity accounts. The household accounts are distributed into rural and urban. For this distribution, the data of household budget survey in 1999 are used. This data is provided by Iranian Statistical Center. Aggregate SAM that has been used in this study presented in Table 4.

**CALIBRATION OF PARAMETERS IN THE MODEL**

In order to solve the model, it is necessary to define the value of all parameters appearing in the equations of the model. There are two kinds of parameters in CGE models. The share parameters are calculated directly from SAM and the behavioral parameters that are needed to estimate or obtain from the other relevant literature. "Calibration" is a popular method for calculating the behavioral parameters. To begin to calibrate CGE model an appropriate benchmark period is chosen. The period may be one year or in average of several years. The benchmark period is assumed to be in equilibrium for a given set of existing policies. Thus, the benchmark data is equilibrium data, that is demand for all factors and outputs is equal to their supply at the existing benchmark relative prices.

After specifying the utility and production functional forms, the benchmark parameters of these functions are established by a calibration process such that the obtained parameters can reproduce the benchmark data. Simply put, calibration is using benchmark data to solve for benchmark parameters. The parameters needed for the CES import and export function was obtained based on calibration procedure. The values of household expenditure function are based on some study done on the Iran economy.

Finally, author used translog linearization of the two-input CES function and econometric methods to estimate the values of parameters on the production function and value added function.

**SIMULATION RESULTS**

Here the study reports the comparative static simulation results of Iran CGE model that has been discussed previously. The base year for the experiments is 1999. We compare the estimates results of a number of tax policy reforms by the base year.

In our model, it is assumed that labor mobility is higher than the capital, thus allocation of labor is done easily by the wage changes while the sectoral capital share has been fixed. Another assumption is price normalization that means consumer price index consider to be fixed. Considering these assumptions, we describe three simulations to examine the consequences of possible changes that occur in Iran economy due the increase labor wage tax in industrial and mining sectors. The policy issues addressed in this paper are 5, 10 and 15% increase in labor wage tax in industry and mining sectors. The effect of these scenario simulations on some

<table>
<thead>
<tr>
<th>Sector</th>
<th>Commodities</th>
<th>Activities</th>
<th>Labor</th>
<th>Capital</th>
<th>Household</th>
<th>Entepriser</th>
<th>Government</th>
<th>Inventory</th>
<th>Investment</th>
<th>Rest of world</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodities</td>
<td>241,572</td>
<td>62,823</td>
<td>128,289</td>
<td>93,116</td>
<td>778,414</td>
<td></td>
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</tr>
<tr>
<td>Activities</td>
<td>698,039</td>
<td>1,051</td>
<td>347,030</td>
<td>778,414</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td>106,128</td>
<td>107,180</td>
<td>14,068</td>
<td>322,785</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Capital</td>
<td>347,030</td>
<td></td>
<td>374,030</td>
<td>347,030</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Household</td>
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<td>51,066</td>
<td>322,785</td>
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<tr>
<td>Entepriser</td>
<td>92,102</td>
<td>9,479</td>
<td>5,010</td>
<td>322,785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>14,068</td>
<td>10,291</td>
<td>6,357</td>
<td>322,785</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Inventory</td>
<td>3,310</td>
<td>6,357</td>
<td>6,357</td>
<td>322,785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>50,104</td>
<td>51,066</td>
<td>51,066</td>
<td>322,785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest of world</td>
<td>66,307</td>
<td>1,072</td>
<td>0</td>
<td>322,785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>778,414</td>
<td>698,039</td>
<td>107,180</td>
<td>347,030</td>
<td>322,785</td>
<td>109,906</td>
<td>124,068</td>
<td>6,357</td>
<td>162,646</td>
<td>96,253</td>
<td>2,752,677</td>
</tr>
</tbody>
</table>

Source: Website of Iran Central Bank, the value of numbers is milliard Rial, Iran currency.

Table 5. Percentage changes in macroeconomics variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>5%</th>
<th>10%</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross domestic production</td>
<td>-0.024</td>
<td>-0.048</td>
<td>-0.074</td>
</tr>
<tr>
<td>Urban household income</td>
<td>-0.418</td>
<td>-0.811</td>
<td>-1.183</td>
</tr>
<tr>
<td>Rural household income</td>
<td>-0.422</td>
<td>-0.819</td>
<td>-1.194</td>
</tr>
<tr>
<td>Government revenue</td>
<td>0.870</td>
<td>1.696</td>
<td>2.483</td>
</tr>
</tbody>
</table>

important macroeconomics indicators is shown in Table 5. As Table 5 shows, the increase of the labor wage tax rate in industry and mining sector may cause Iran's GDP and household income to decline from the benchmark level while the government revenue would increase.

The percentage changes in GDP measures the taxes efficiency. In all cases, taxes efficiency is lost and efficiency loss is less than 0.01%. Percentage of decreasing household income for urban and rural household is about equal. We interpret the main channels for these changes. Increasing labor wage taxes through the labor supply and goods demand channels affects on Iran's economy.

Sectoral effects

The sectoral effects are represented in Tables 6 to 8. First of all, we interpret the effect on labor input. Regarding total labor force is assumed to be constant, increasing labor wage taxation in industry and mining sectors does not affect on total employment in economy but it will change the structure of sectoral employment (Table 6). As expected, imposed taxes on labor wage lead to workforce reduction in industry and mining sectors and it makes to increase employment in other sectors. The highest percentage increase in employment is related to oil and construction sectors. It should be noted that the share of agriculture, oil, industry, construction and services employment in total employment is, 24, 1, 18, 11 and 46%, respectively. Due to the increase of labor wage taxes in the industrial sector, agriculture and services sectors would experience decrease in output price, while the remaining sectors, especially industry would see increase (Table 6).

It should be mentioned that the percentage change of oil output price is completely related to
change in domestically output oil price and in our model the world price of oil will not affect by tax policy reform in Iran. Table 6 also shows that the production falls in industrial sector and it rises in other sectors. The highest and smallest increases in output occur in construction and agriculture sectors, respectively. Because the share of agriculture, oil, industry, construction and services output in total output is, 13, 8, 30, 8 and 42%, respectively, and regarding two amount of sectoral output percentage changes, total output in Iran economy decreased. Increasing labor wage tax in industrial sector causes household final demand goes down in industry and construction sectors and go up in other sectors. These results are contradictory to our prior expectations.

In the sectors that the output price has increased, household final demand decreases and where the price has gone up, household final demand has declined. For example, increasing labor wage tax in industrial sector by 15% makes to decrease in household final demand for industry and construction sectors by -1.8 and -2% and it causes to increase in household final demand for agriculture and services sectors by 0.2 and 0.17%. For better interpretation, it is useful that the composition of household final demand is considered. The share of agriculture, industry, construction and services consumption in total household final demand is, 19, 45, 1 and 35%, respectively. Also it is noticeable that in all sectors, percentage change of final demand for urban and rural household nearly was the same (Tables 7 and 8).

Conclusions

The Iranian government revenue high dependency on oil sales caused the country to experience a severe reduction of infrastructural development when the international price of oil fell down. The Iranian policy maker changed their strategy by focusing on non-oil revenue such as taxes. Despite of emphasis of the Third and Fifth Socio-Economic and Cultural Development Plan for increasing the taxes revenue to GDP ratio, it has been nearly constant. Thus, the Iranian government has failed in achieving their objectives. In most countries one of the major sources of government revenue is wage labor tax but in Iran, it does not play a major role. In this regard, the government should increase the wage labor tax base to reduce dependency on oil as a major source of income. However, any tax policy reform impact on economic variables and the policy maker for better judgments should be informed about the consequences of policy changes. Therefore, the main purpose of this study is to explore the effects of increasing wage labor tax rate
in industrial sector on Iran economy by applying a CGE model.

As author knows, there is no study about the effects of wage labor tax reform on Iran economy using CGE model. Therefore, this study would be useful for decision makers. It contacted three simulations to examine the consequences of possible changes that occur in Iran economy due the increase labor wage taxes. The policy issues addressed in this paper are 5, 10 and 15% increase in labor wage tax in industry and mining sectors. The results of analysis show that increasing wage labor tax rate in industrial sector will decrease GDP and household income and it will increase government revenue. For example, 20% in the wage labor tax rate would have negative effect on the GDP. Gross domestic production (-0.074%), urban household incomes (-1.183%) and rural household incomes (-1.194%) all decreased in the economy and the government revenue (2.483%) increased. Also, imposed tax on wage labor in industrial sector caused laborforce of industrial sector move to another sectors. Thus output of industrial sector decline and output of other sectors increased.

REFERENCES