Studying the Effects of non oil Exports on Targeted Economic Growth In Iranian 5th Development Plan: A Computable General Equilibrium Approach

Rasoul Bakhsi Dastjerdi, Dr.
Reza Moosavi Mohseni, Dr.
Somayye Jafari

Available at: https://works.bepress.com/reza_moosavi_mohseni/10/
Studying the Effects of non oil Exports on Targeted Economic Growth

In Iranian 5th Development Plan

A Computable General Equilibrium Approach

Rasul Bakhshi Dastjerdi
Assistant Professor of Economics
University of Yazd
rbakhshi@yazduni.ac.ir

Reza Moosavi Mohseni
Assistant Professor of Economics
Azad University, Shiraz Branch
& Mathematics Department, UPM, Malaysia

Somayye Jafari
M.A in Economics
University of Yazd

Abstract:
we investigate the effects of non oil export on Iran’s economic growth using a computable general equilibrium (CGE) and study which tradable sectors has a larger share in reaching to targeted growth rate 8% in 5th socio economic development plan. We calibrate the model by GAMS (with emphasis on foreign trade sector). Numerical solution to the model is based on Iran’s social accounting matrix (SAM). Results show that 2.03% of targeted economic growth rate is achieved by encouraging a 6% growth in export. It also be mentioned that industry and mine sector in Iran, has more influence on growth than other non-oil sectors.

Key words: Computable General Equilibrium, Social Accounting Matrix, Export, Economic Growth, Iran’s Economy

JEL: F10, D58, C68
1. Introduction

According to general policies of Iranian 5th socio-economic development plan (2010-15), it is targeted that Iran's economy must experience a rapid annual economic growth rate equal to 8%. The fifth development plan sets the guidelines for the socio-economic development of the country over the next five years. The five-year plan is part of "Vision 2025", a plan for long-term sustainable growth. The target is self-reliance by 2015 and the implementation of an ambitious economic reform plan which includes subsidy, banking, taxation, currency, infrastructure and productivity as its main focus. Other main objectives of the fifth plan are making improvements in public health care, and expanding international relations.

Iran's annual growth rate in 2010 is 2.6% but target is 8%.

It seems that export sector in Iran's economy can play a significant role to achieve targeted economic growth. As a policy making question we want to know how the export sector can affect Iran's economic growth. Another question which needs to answer is: among export sub-sectors, which them can emerge economic growth more?

For studying above circumstances we used computable general equilibrium approach which its design is based on Iran's social accounting matrix.

In this study, we will overview the empirical literature behind relations between export and growth. Then we introduce some remarkable notes on the structure of social accounting matrix and CGE modeling. After these, we constitute CGE model which is compatible with the structure of Iran's economy using GAMS language and we solve it to get policy suggestions for promoting growth via reinforcing export sector.

2. Literature Overview

Relationship between Trade and economic growth is one of the most controversial issues in economics. There are many empirical studies on this topic. Dissension among economists about selecting export development strategy or import replacement strategy is the most important reason for emerging these studies (Motevaseli, 1999, p.42).

From theoretical point of view, a lot of reasons have been provided to confirm the hypothesis of growth based on promoting export. First, empirical studies show that all developing countries suffer from suboptimal usage of their capacities. So, by export promoting policies, useless capacities will be utilized. Second, consumers can obtain commodities in fewer prices and therefore welfare will be increased. Third, export promoting policies can lead the economy toward utilize its comparative advantages. Forth, these policies increase firm’s efficiency by arising competition among domestic and foreign commodities.

2-1. Review of empirical studies

Most of empirical studies about relation between export and growth are based on econometric approaches. These studies reach to different results. The results are as following: bilateral relation, not any significant relation and relation from export to growth and vice versa.

Proxy variables for representing trade in empirical studies are export, import, share of export in GDP and foreign trade volume. We review some related studies in following.
Balassa (1978) has used Michlepolos method (1973) to investigate the relationship between export and economic growth for two periods (1966 - 73 and 1960 – 66) in 11 developing countries. The results show that 1% increase in export can increase national product by 0.04%. It also shows that fiscal policies with export oriented approach have more impact on economical growth than fiscal policies with import replacement approach. He also showed that there is a significant correlation between economic growth variables and non-export GNP. This in turn, represents the indirect effects of export on income and expenditures.

Kavousi (1984) attempted to study the relationship between export and economic growth for 73 developing countries. It shows that in both groups of low- and middle-income countries, export expansion is associated with better economic performance and that an important cause of this association is the favorable impact of exports on total factor productivity. The paper also demonstrates that the effect of commodity composition of exports on the relationship between export expansion and economic growth is substantial in more advanced developing economies. Kavousi has concluded that there is a positive relationship between export and economic growth, and this growth is not restricted to the countries with average income, rather it contains countries with low income as well.

Chow (1987) investigates the causal relationship between export growth and industrial development in eight Industrializing Countries. Results of Sims’ causality test show that for most of these countries, there is strong bidirectional causality between the growth of exports and industrial development. These findings support the export-led growth strategy in that expansion in exports not only promote the growth of national income but also lead to structural transformation of the developing countries. He concluded that export growth and industry development can reinforce each other interactively.

Sharma and Dhakal (1994) investigates the causal relationship between the exports and output growth in 30 developing countries over the period from 1960 to 1988 in a multivariate framework. This study identities a feedback prima facie causal relationship between exports and output growth in five countries, export growth prima facie causes output growth in another six countries; output growth prima facie causes export growth in a further eight countries; and no causal relationship was observed between export growth and output growth in the remaining 11 countries. They also have found that in 15 countries the foreign exchange rate prima facie caused export growth, and that in 12 countries world output caused export growth.

Michealy (1977) showed that, since export is a part of national product, the problem of the correlation of these two variables is evitable in the assessment of economic growth and export growth models. In other words the growth rate of national production is equal to the result of the sum of the growth of internal demand and export. Therefore, high export growth requires a relatively low internal demand.

Safari (1998) has used Granger causality techniques and Feder’s growth model to study the effect of export on the Iran’s economic growth during 1959 to 1993. Results show that there is one way relation from export growth toward economic growth and among effective factors on economic growth, the coefficient of export is the biggest one. According to her results, among GDP’s subsectors, agriculture export has no significant effect on economic growth, and it only affects growth agricultural sector. But industry and services’ exports have affected total GDP growth and sectoral growth.
Akbari (2000) has tested the effect of export on Iran’s economic growth, with emphasis on oil and non-oil export using SUR and simultaneous equations methods. He has concluded that capital formation is a positive function of export growth. Industrial and oil exports have significant effect on economic growth in period 1969-95. According to his results, industrial export has affected by export development policies. But non-oil exports (except industrial export) have no significant effect on economic growth, because non-industrial export is containing of traditional and agricultural commodities.

Motevasseli (1999) in his study has tried to answer two questions: Can we rely on export growth in order to achieve more rapid economic growth? And, can we apply growth statistics of previous period to improve the predictions of future growth of economy? In order to answer these questions, he uses a pattern in which GNP is considered as a function of self interval, export and its interval and import and its interval as following:

$$\log GDP = \alpha_0 + \sum_{i=1}^{r} \alpha_i \log GDP_{t-i} + \sum_{j=0}^{s} \beta_j \log X_{t-j} + \sum_{m=0}^{k} \gamma_m M_{t-m} + U_t$$

Where, $X$ and $M$ are export and import respectively. According to his results, Granger causality test implies on existing a bilateral relationship between export and economic growth.

Estimated coefficients indicate that 1% increase in export leads to 0.16% increase in GNP growth, and 1% increase in GNP growth rate leads to 2.57 percent increase in export growth rate. Comparison of the two above quantity reveals that increase of GNP growth, leads to more export growth and its final effect is greater. With respect to these outcomes he strongly suggests export development strategy.

Haddad and Perobelli (2005) have used computable general equilibrium approach to investigate the effects of export on economic growth for Brazil. They use CGE approach to enable them for studying substitution between domestic goods (interchangeable) and investigate change in relative price of import. Their model is containing of 8 production sectors, 8 goods sectors and 27 region contain of households, federal government, regional government and the rest of the world. Using model, they conclude a positive strong relationship between exports and economic growth.

Mojaverhosseini (2006) by using a CGE model investigates the macroeconomic effects of entering Iran to World Trade Organization. His model is containing 50 sectors. He has analyzed the results via two scenarios (entering scenario and no entering scenario). He study the model under different scenario policies, such tariffs, tariff unification, exchange rates unification, foreign market access, income transfers because of removing subsidies to households and 20% increase in oil prices.

Khoshakhlagh and Moosavi (2006) Using a computable general equilibrium model to study Dutch disease in Iran’s economy. Their oil revenues as the desired operating direction of Dutch disease in the economy have attention. Their model divides the economy into seven sectors which are containing of exchangeable and non-exchangeable parts. These seven sectors are oil, industry, mining, water and electricity, gas and services they conclude that 50% increase in oil revenues, will weaken exchangeable sectors especially agriculture and industry sectors, but construction sector will be strengthened. It also strengthen real exchange rate and so import will be increased and export will be decreased.
Tayyebi and Mesrinejad (2007) have focused specially on the effects of income distribution and welfare of households using a computable general equilibrium (CGE) models. They evaluate impacts of trade liberalization on Iran’s agriculture sector on the welfare level of the Iranian households. By conducting several scenarios for reducing tariffs, they concluded that the welfare level of households is positively affected in conjunction with change in their income, consumption and saving.

By reviewing empirical studies, it seems that there aren’t any general equilibrium studies on relation from export to growth for Iranian economy. Thus we try to investigate this relation by using CGE approach. But before describing the model, it is useful to review the structure of computable general equilibrium models.

3. The Structure of Computable General Equilibrium Models

Computable general equilibrium (CGE) models surpassed and replaced AGE models in the mid 1980s, as the CGE model was able to provide relatively quick and large computable models for a whole economy, and was the preferred method of governments and the World Bank. CGE models are heavily used today, and while ‘AGE’ and ‘CGE’ is used interchangeably in the literature, Scarf-type AGE models have not been constructed since the mid 1980s, and the CGE literature at current is not based on Arrow-Debreu and General Equilibrium Theory as discussed in this article. CGE models, and what is today referred to as AGE models, are based on static, simultaneously solved, macro balancing equations (from the standard Keynesian macro model), giving a precise and explicitly computable result (Mitra-Kahn 2008).

There are two approaches for empirical study in applied economics; one is based on partial economic equilibrium and the second is based on general economic equilibrium. In partial approach we emit other effective conditions in the model. But general equilibrium theory is a branch of theoretical neoclassical economics which seeks to explain the behavior of supply, demand and prices in a whole economy with several or many markets, by seeking to prove that equilibrium prices for goods exist and that all prices are at equilibrium, hence general equilibrium, is in contrast to partial equilibrium. As with all models, this is an abstraction from a real economy; it is proposed as being a useful model, both by considering equilibrium prices as long-term prices and by considering actual prices as deviations from equilibrium.

Until the 1970s general equilibrium analysis remained theoretical. With advances in computing power and the development of input-output tables, it became possible to model national economies, or even the world economy, and attempts were made to solve for general equilibrium prices and quantities empirically.

Applied general equilibrium (AGE) models were pioneered by Herbert Scarf in 1967, and offered a method for solving the Arrow-Debreu General Equilibrium system in a numerical fashion. This was first implemented by Shoven and Whalley in 1972 and 1973, and were a popular method up through the 1970s. In the 1980s however, AGE models faded from popularity due to their inability to provide a precise solution and its high cost of computation. Also, Scarf’s method was proven non-computable to a precise solution by Velupillai (2006).
Computational General Equilibrium Models associated economic sectors not only consider the decision rule, but the behavior of consumers and producers as well as with economic theory to consider these models assume that economic factors, their objective functions Considering the constraints facing their own optimal. These models based on general equilibrium models and why by Kenneth and Debreu was expanded and data are in the real economy will blend together and form the numerical level of demand, supply and equilibrium prices in markets are estimated.

In order to solve the general equilibrium pattern numerically, GAMS software package can be used which is a powerful tool for solving linear and nonlinear equations. The most fundamental information basis of the general equilibrium model is social accounting matrix. This matrix is formed base on the cycle of the income of an economy. The foundation of the structure of social accounting matrix is based on the input-output table and national income accounting.

The designed model in this study includes 4 production sections of agriculture, services, construction, mine and industry. These sections are the products of the products by using a set of production factors (labor force and capital) and intermediate material in the model. These productive sections earn their income through selling their own products to consumers that contains both internal consumers (families and government) and external consumers (outside world). This income used to pay the production institution and to pay wages of primary production factors.

In practice, the interactions of variables in different economical sections, institutions and outside world are provided based on various equations and functions. Iran is considered small in relation to outside world. In other words “the hypothesis of small country “is considered from Iran. Based on this hypothesis both demand of country for import and demand of the outside world for export of Iran would have indefinite elastic. To put in another words, we can not neither influence the global price of imported goods nor have any effects on the global prices of export to the outside world. In addition the provided model is among the static comparative models. Therefore the application of policies and changing the exogenous variables is possible to be assimilated. For this reason and with respect to the provided material designing a general equilibrium model for economy of Iran is necessary. This section briefly reviews the model equations used in this article we will. Tables 2 and 3 in the appendix, represent the endogenous and exogenous variables of the model.

3. Model
The model which is used for calibrating is based on Lofgren (2003). The model has 39 equations contains of 8 equations for prices, 6 equations for production, 7 equations for foreign trade, 2 equations for consumption, 8 equations for income, 8 equations for saving and investment.

3-1. Price Equations
The price equations are as follows:

\[ PM_c = (1 + m_c) pwm_tEXR \]  \hspace{1cm} c \in CM \hspace{1cm} (1)
Where $PM_c$ is the indicator of the internal import price, $pwm_c$ is the global import price and $tm_c$ is the tariff rate and $EXR$ is the foreign exchange rate, and $c$ is the index for import goods.

$$PE_c = pwe_c (1 + te_c )EXR$$ \hspace{1cm} (2) \hspace{1cm} c \in CE$$

Where $PE_c$ is the internal export price, $pwe_c$ is global export price and $te_c$ is the subsidy rate.

$$PQ_c = \frac{PD_c QD_c + PM_c QM_c}{Q_c} \hspace{1cm} c \in C \hspace{1cm} (3)$$

Where $PQ_c$ is the price of goods which are supplied in the market, $PD_c$ is the price of domestic goods, $QD_c$ is the amount of domestic goods, $PM_c$ is the price of the imported goods, $QM_c$ is the amount of imported goods and $Q_c$ is the sum of goods which are supplied in the market.

$$PX_c = \frac{PD_c QD_c + PE_c QE_c}{QX_c} \hspace{1cm} (4) \hspace{1cm} c \in C$$

Where, $PX_c$ is the indicator of the price of domestic goods which are exported or consumed. $PE_c$ is the price of exported goods, $QE_c$ is the quantity of export and $QX_c$ is the total production.

$$PVA_a = PX_c (1 - ta_c ) - \sum_{c \in C} ica_{ca} PQ_c \hspace{1cm} a \in A \hspace{1cm} (5)$$

Where $PVA_a$ is value added price and $ta_c$ is the indirect tax and $ica_{ca}$ is the fixed coefficient of input-output where $a$ index refers to actives.

$$PK_c = \sum_{c \in C} PQ_c b_{ac} \hspace{1cm} a \in A, c \in C \hspace{1cm} (6)$$

Where $PK_c$ is Price of per unit of capital which is equal to the total value of capital goods used to produce it.

$$PA_a = \sum_{c \in C} PX_c \theta_{ac} \hspace{1cm} a \in A \hspace{1cm} (7)$$

In the above relation, $PA_a$ shows the price of activity branch as weighed average of domestic products ($PX_c$).

$$\overline{CPI} = \sum_{c \in C} PQ_c cwts_c \hspace{1cm} (8)$$
CPI is the index of model normalization rule in the form of the price for combined goods. Weights are indicated by cwtsc which is the proportion of combined goods in the consumption bundle.

3-2. Production Equations
Producers earn their income from domestic and foreign markets. The gained income is used to buy intermediate goods and pay to production factors. Producers maximize their profit with respect to the production function.

\[ QA_a = ad_a \prod_{f \in F} QF_{fa}^{\alpha_{fa}} \quad a \in A \]  

Where, \( QA_a \) is production function for activity \( a \), \( ad_a \) is the efficiency parameter in the production function of activity \( a \), \( QF_{fa} \) is demand for factor \( f \) in the activity \( a \) and \( \alpha_{fa} \) shows the proportion of value added of factor \( f \) in activity \( a \).

\[ QINT_{ca} = ica_a QA_a \]  

\( QINT_{ca} \) shows the amount of intermediate expenditure of activity \( a \) for good \( c \), and \( ica_a \) is parameter is intermediate expenditure for a unit of total production. In this section, we face a matrix which the numbers of its rows are equal to the number of goods, which is shown by \( c \), and its columns are equal to the number of activities which is shown by \( a \).

\[ QX_C = \sum_{a \in A} \theta_{ac} QA_a \]  

\( QX_C \) is the total domestic product of the good \( c \), which is sold in domestic market (\( QD_C \)) or exported (\( QE_C \)). How this allocation would be done is illustrated in foreign trade equations.

\[ WF_f WFDIST_{fa} = \frac{a_{fa} PVA_{fa} QA_a}{QF_{fa}} \quad f \in F, a \in A \]  

The above relation shows the demand function for production factors in which \( WF_f \) is the average price of production factors, and \( WFDIST_{fa} \) indicates the deviation of the production factor wage \( f \) from the average price of production factor \( f \) in activity \( a \). If wages are the same in all activities, the value of \( WFDIST_{fa} \) will be equal to one.

\[ \sum_{a \in A} QF_{fa} = QFS_f \quad f \in F \]  

The above equation shows the equilibrium condition in the factors market. In fact this equation shows the balance and equilibrium of demand and supply. According to this relation, the sum of demands for production factors by activity branches (\( \sum_{a \in A} QF_{fa} \)) should be equal to supply of production factors (\( QFS_f \)).
\[ QQ_c = \sum_{a \in A} QINT_{ca} + \sum_{h \in H} QH_{ch} + qg_c + QINV_c \quad c \in C \]  

Equation 14 shows total supply \( QQ_c \) and total demands of the economy which contains intermediate demand \( \sum QINT_{ca} \), consumption demand of households \( \sum_{c \in C} QH_{ch} \), consumption demand of government \( (QG) \) and the investment demand \( (QINV_c) \).

### 3-3. Foreign Trade Equations

The model contains the hypothesis of qualitative difference between domestic goods and imported goods. This qualitative difference has been considered by hypothesizing incomplete substitution between import and domestic goods. We use Armington function to explain this issue. This function indicates that imported goods are incomplete and imperfect substitutions for domestic goods.

According to this hypothesis, total demand of goods for each sector is defined as follow:

\[ QQ_c = aq_c (\delta_c^g QM_c^{p_f} + (1 - \delta_c^g)QD_c^{p_f})^{-1} \quad c \in CM \]  

where \( \delta_c^g \) and \( 1 - \delta_c^g \) are indicators of the proportion of import and domestic goods in Armington function, and \( p_f^g \) is the elasticity of substitution between import and domestic goods.

\[ \frac{QM_c}{QD_c} = \left( \frac{PD_c}{PM_c} \frac{\delta_c^g}{1 - \delta_c^g} \right)^{1/p_f^g} \quad c \in CM \]  

The above relation shows that the optimal amount of demand of these two groups of goods depends on their relative price.

\[ QQ_c = QD_c \quad c \in CNM \]  

Equation 17 shows the amount of compound supply of non imported goods. Similarly, an imperfect transferring is considered for domestic selling of goods and their foreign selling. That is, producers can supply products to domestic markets or export them. Further, total supply function is defined as follows:

\[ QX_c = at_c (\delta_c^i QE_c^{p_f} + (1 - \delta_c^i)QD_c^{p_f}) \quad c \in CE \]  

The way of allocating these goods into domestic market and export is determined by a CET function. In the above relation \( \delta_c^i \) shows the proportion of each variable, \( p_f^i \) is derived from elasticity of substitution between domestic selling and export and it indicates that these two goods were not perfect substitution for each other.

\[ \frac{QE_c}{QD_c} = \left( \frac{PE_c}{PD_c} \frac{1 - \delta_c^i}{\delta_c^i} \right)^{1/p_f^{i-1}} \quad c \in CE \]  

In the above relation, the optimal amount of the supply of these two markets is determined by their relative price.
\[ QX_c = QD_c \quad c \in CNE \] (20)

For non-export goods, equation (20) indicates that there is a balance between domestic sells of goods and domestic goods.

\[ BP = \sum_{c \in CM} pwm_cQM_c - \sum_{c \in EQ} pwe_cQE_c - FSAV \] (21)

BP represents the current account balance with due attention to the account for rest of the world. It is necessary that the difference between export and import must equal to foreign saving (FSAV).

4-3 Equations of consumption

\[ QH_{ch} = \frac{\beta_{ch}(1 - mps_h)(1 - ty_h)YH_h}{PQ_c} \quad c \in C, h \in H \] (22)

Equation 22 shows the households consumption where \( \beta_{ch} \) shows the proportion of good \( c \) from the total household consumption expenditure, \( mps_h \) is the final rate of the saving of household \( h \), and \( ty_h \) shows the rate of tax on the household income. \( QH_{ch} \), in the left side, shows the household consumption expenditure (the demand function for goods and services).

\[ EG = \sum_c PQ_c.qg_c + \sum_{h \in H} \sum_{tr_{h, gov}} \] (23)

In equation 23, \( EG \) shows the government expenditure, which contained the sum of the multiplication of the price of compound goods \( PQ_c \), by the amount of the consumed goods by government \( qg_c \) and households' transfer payments.

5-3 Equations of Income

The household institution is the owner of production factors such as labor force and capital. Therefore, one of the household's income resources is the income of production factors.

\[ YF_f = \sum_{a \in A} WF_f WFDIST_{ja} QF_{ja} \quad a \in A, f \in F \] (24)

\[ YF_{hf} = shry_{hf} \sum_{a \in A} WF_f WFDIST_{ja} QF_{ja} \quad h \in H, f \in F \] (25)

Equation 25 shows the income of production factors. In this relation \( YF_{hf} \) shows the income of household \( h \) from factor \( f \) and \( shry_{hf} \) is the proportion of household \( h \) from production factors income.

\[ YH_h = \sum_{f \in F} YF_{hf} + tr_{h, gov} + EXR.tr_{h, row} \quad h \in H \] (26)
Equation 26 shows the household income. In the above equation $tr_{h, gov}, tr_{h, row}$ are respectively the representative of payments of rest of the world to households and payments of government payments to households.

$$TARIF = \sum_{c \in CM} pwm \cdot QM_c \cdot tm_c \cdot EXR$$  

(27)

$$EXPSUB = \sum_{c \in CE} pwe \cdot QE_c \cdot te_c \cdot EXR$$  

(28)

$$HHTAX = \sum_{h \in H} YH_h \cdot ty_h$$  

(29)

$$INDTAX = \sum_{c \in C} tq_c \cdot (PD_c \cdot QD_c + PM_c \cdot QM_c)$$  

(30)

$$YG = TARIF + HHTAX + INDTAX + Y_{od} - EXPSUB$$  

(31)

In equation 31, $YG$ is the government income. The first sentence in the right side of above equation is the income obtained from tariffs. The second sentence is household taxes, the third is indirect taxes, the fourth is oil income, and finally the last is the sum of sectors' export subsides which should be subtracted from the government income.

6-3 Equations of Saving and Investment

$$HHSAV = \sum_{h \in H} mps_h \cdot (1 - ty_h) \cdot YH_h$$  

(32)

$$GSAV = YG - EG$$  

(33)

$$DSTQ_a = dstr \cdot QA_a$$  

(34)

$$QINV_c = \overline{qinv} \cdot IADJ$$  

(35)

$$\begin{align*} 
SAVING &= INVESTMENT \\
\sum_{h \in H} mps_h \cdot (1 - ty_h) \cdot YH_h + (YG - EG) + EXR \cdot FSAV &= \\
\sum_{c \in C} P_c \cdot QINV_c + \sum_{c \in C} P_c \cdot DSTA Q_a &= \\
PK_c \cdot DK_c &= \lambda_c \cdot INVESTMENT \\
ID_c &= \sum_a b_{ca} \cdot DK_a 
\end{align*}$$  

(37-39)

Equation (35) shows the demand for investment goods. $\overline{qinv}$ is the primary amount of the investment. $IADJ$ is the index for adjustment of investment.
is the Coefficient for total fixed investment. Equation 39 is the final demand for each item.

4. Data and solving method
The first step in using a CGE model is designing a social accounting matrix which is compatible with the structure of the CGE model. A Social Accounting Matrix (SAM) represents flows of all economic transactions that take place within an economy (regional or national). It is at the core, a matrix representation of the National Accounts for a given country, but can be extended to include non-national accounting flows, and created for whole regions or area. SAMs refer to a single year providing a static picture of the economy. SAMs are square (columns equal rows) in the sense that all institutional agents (Firms, Households, Government and 'Rest of Economy' sector) are both buyers and sellers. Columns represent buyers (expenditures) and rows represent sellers (receipts). SAM's were created to identify all monetary flows from sources to recipients, within a disaggregated national account. The SAM is read from column to row, so each entry in the matrix comes from its column heading, going to the row heading. Finally columns and rows are added up, to ensure accounting consistency, and each column is added up to equal each corresponding row. We use Iran's 17×17 SAM for required data of the model in the paper. We use GAMS language and "mcp" method to solve the model.

5. Discussion of result
The value of the parameters of the model would be determined by solving the model. We consider these values as a base state. This state is used for comparison among scenarios. We study three scenarios; a 10% increase in export, a 20% increase in export and a 30% increase in export. We emit construction sector from our discussion because it has no export. Construction sector is included in the model as a non export sector. Table 1 shows the results for calibrating the model according to three above mentioned scenarios. Table shows the positive relation between export and economic growth. Among exportable non- oil sectors, Industry and mine sector has the most effect on Iran economic growth. According to the third scenario, a %30 increase in export can grow national output by %19.96 and industry. %64 of this value is belong to industry and mine sector.

Table 1: The results of the implementation scenarios to increase exports on economic growth

<table>
<thead>
<tr>
<th>sectors</th>
<th>First Scenarios</th>
<th>Second scenarios</th>
<th>Third scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%10 increase export</td>
<td>%20 increase export</td>
<td>%30 increase export</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.96%</td>
<td>2.047%</td>
<td>3.08%</td>
</tr>
<tr>
<td>Industry and Mine</td>
<td>5.3%</td>
<td>9.12%</td>
<td>12.81%</td>
</tr>
<tr>
<td>Construction</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Services</td>
<td>1.9%</td>
<td>3.021%</td>
<td>4.07%</td>
</tr>
<tr>
<td>Total</td>
<td><strong>8.96%</strong></td>
<td><strong>14.80%</strong></td>
<td><strong>19.96%</strong></td>
</tr>
</tbody>
</table>

Reference: Researchers' Computations
6. Conclusion
In this paper we have studied the effect of export on Iran's economic growth. Although there are many studies on this topic, but, most of these studies are based on partial equilibrium methods and they did not pay serious attention via general equilibrium approach. Results show that there is a positive relationship between the export increase and economic growth. Results also show that the Industry and Mine sector has the greatest effect on economic growth among all non oil exportable sectors. According to this result, paying attention to reinforcement of non oil export, with great emphasis on industrial export, can facilitate and enhance Iran's economic growth.

According to general policies of the Iran's fifth development plan to achieve annual growth rate of %8, increase exports via scenarios introduced in this study, can fulfill some part of the targeted annual growth %8. For example, selecting the third scenario which contains %30 increase in exports over five years, can affect Iran's economic growth by %10.14. According to this rate, the share of export in realization of targeted annual growth rate is equal to %2.03. Annually if export grows by %6, national output grows %2.03.

7. Reference
8. General Policies of Iran's Fifth Development Program, Dated 2009/10/1
Appendix 1:

Endogenous and Exogenous Variables of the Model

Table 2: Exogenous Variables

<table>
<thead>
<tr>
<th>Definition</th>
<th>Variable</th>
<th>Definition</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Rate</td>
<td>EXR</td>
<td>Oil Incomes</td>
<td>Y_{oil}</td>
</tr>
<tr>
<td>Supply of Production factors</td>
<td>QFS_f</td>
<td>Consumed Goods by Government</td>
<td>qg</td>
</tr>
<tr>
<td>Index of the Model Normalization Rule</td>
<td>CPI</td>
<td>Global Export Price</td>
<td>pwe_e</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Global Import Price</td>
<td>pwm_e</td>
</tr>
</tbody>
</table>

Table 3: Endogenous Variables

<table>
<thead>
<tr>
<th>Definition</th>
<th>Variable</th>
<th>Definition</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Expenditure</td>
<td>EG</td>
<td>Production</td>
<td>QQ_c</td>
</tr>
<tr>
<td>Production factors' Income</td>
<td>YF_f</td>
<td>Investment Destination</td>
<td>ID_c</td>
</tr>
<tr>
<td>Household's Income from factors of production</td>
<td>YF_{hf}</td>
<td>Domestic Product</td>
<td>QD_c</td>
</tr>
<tr>
<td>Direct Taxes</td>
<td>HHTAX</td>
<td>Activities Production Level</td>
<td>QA_a</td>
</tr>
<tr>
<td>Indirect Taxes</td>
<td>INDTAX</td>
<td>Demand for Intermediates</td>
<td>QINT_{ca}</td>
</tr>
<tr>
<td>Exports Subsidies</td>
<td>EXPSUB</td>
<td>Demand for Production Factors</td>
<td>QF_{fa}</td>
</tr>
<tr>
<td>Imports Tariffs</td>
<td>TARIF</td>
<td>Price of production factors</td>
<td>WF_f</td>
</tr>
<tr>
<td>Government Income</td>
<td>YG</td>
<td>Value Added Price</td>
<td>PVA_a</td>
</tr>
<tr>
<td>Household's Saving</td>
<td>HHSAV</td>
<td>Import Price</td>
<td>PM_c</td>
</tr>
<tr>
<td>Household's Consumption Expenditures</td>
<td>QH_{ch}</td>
<td>Export Price</td>
<td>PE_c</td>
</tr>
<tr>
<td>Government Saving</td>
<td>GSAV</td>
<td>price of Domestic Goods</td>
<td>PD_c</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td>Symbol</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Foreign Saving</td>
<td>Price of supplied goods in the market</td>
<td>$PQ_c$</td>
<td></td>
</tr>
<tr>
<td>Total Saving</td>
<td>Price of the compound goods (domestic and export)</td>
<td>$PX_c$</td>
<td></td>
</tr>
<tr>
<td>Total investment</td>
<td>Price capital</td>
<td>$PK_c$</td>
<td></td>
</tr>
<tr>
<td>Inventory Stock</td>
<td>Sum of goods which are supplied in the market</td>
<td>$Q_c$</td>
<td></td>
</tr>
<tr>
<td>Investment Sector origin</td>
<td>Total production of each sector</td>
<td>$QX_c$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balance of Payments</td>
<td>$BP$</td>
<td></td>
</tr>
</tbody>
</table>

### Appendix 2. Social Accounting Matrix

#### Table 4. Social Accounting Matrix for Iran (2001) – Summarized Version

<table>
<thead>
<tr>
<th>Activity</th>
<th>Commodities</th>
<th>Production Factors</th>
<th>Institutions</th>
<th>Capital Account</th>
<th>Rest of the World</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities</td>
<td>800825.5</td>
<td></td>
<td></td>
<td>12205.3</td>
<td>133145</td>
<td>946212.2</td>
</tr>
<tr>
<td>Commodities</td>
<td>30449.7</td>
<td></td>
<td></td>
<td>304570.4</td>
<td>97219.2</td>
<td>223660</td>
</tr>
<tr>
<td>production Factors</td>
<td></td>
<td>Labor 14381.3.4</td>
<td></td>
<td>143813.6</td>
<td>143813</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capital 48209.2</td>
<td></td>
<td>482092</td>
<td>482092</td>
<td></td>
</tr>
<tr>
<td>Institutions</td>
<td></td>
<td></td>
<td>Household 1438.13</td>
<td>10468</td>
<td>2093</td>
<td>638466</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Government 15810.3</td>
<td>229864.2</td>
<td>108367.2</td>
<td>154024.8</td>
</tr>
<tr>
<td>Capital Account</td>
<td></td>
<td></td>
<td></td>
<td>310909.4</td>
<td>34132.3</td>
<td>121381.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>223660</td>
<td>122223</td>
</tr>
<tr>
<td>Rest of the World</td>
<td></td>
<td></td>
<td></td>
<td>122223</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>946212.2</td>
<td>946212.2</td>
<td>143813</td>
<td>482092</td>
<td>638466</td>
<td>154024.8</td>
</tr>
</tbody>
</table>