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ISSN: 2090-4274 Journal of Applied Environmental and Biological Sciences www.textroad.com

The examination of the impact of subsidies targeting on the product factors productivity using of model of Computable General Equilibrium (CGE)

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Received: March 31, 2016 Accepted: May 20, 2016

ABSTRACT

In recent years' targeting of subsidies discussion in our country is propounded seriously and the first phase of that is executed in the past years. The allowance is one of the tools that the government applies to support different layers of people and economic provinces. The purpose of allowance paying is to allocate resource optimization, prices stabilization, making balance between supply and demand and also income redistribution. In this research, the impact of subsidies targeting on factors production productivity (labor and capital factor) are examined. To achieve this goal, a computable general equilibrium model (CGE) has been established by using of data of the Qazvin province. In this research, social accountancy matrix contains of 11 parts. The effects of indirect subsidies elimination and pay the same amount as direct subsidy and the impact of these changes on labor productivity and capital has been analyzed in the following three steps. The first step is the effects of indirect subsidies, The second step is the effects of direct subsidies and The third step is to investigate the effects of changes in indirect subsidies and direct payments to households. The analysis results shows that the labor factor productivity increase in 4 sectors and reduce in other sectors. Also this policy, positive impact on capital factor productivity in 9 sectors and negative impact in other sectors.

KEYWORDS: Computable General Equilibrium (CGE), subsidies targeting, productivity, Labor, Capital.

1. INTRODUCTION

In all countries, regardless of the domains of governance and tenure, governments had to intervene in some of particular matters and policies and use appropriate tools in order to determine the economic, social or cultural orientations of the society. The Intervention sometimes applies in advancement of economic policies such as production and consumption of domestic products or exports and sometimes it applies in the domain of social policies which it is usually established with the purpose of public welfare, in general and support of vulnerable groups, in particular [1].

Subsidy is one of the most important economic tools and supportive policies of government to support the vulnerable groups of the society and particular production sections. Government will achieve to its goal and social security and wellbeing will strengthened if the subsides be paid to the target groups, but these public payments not only has no effect in improving the income and welfare of vulnerable groups, but also they result in more enjoyment of people who are using more subsides. Therefore, the need to pay subsidies and to support vulnerable groups is obvious, but the matter that should be considered is how to pay the subsidies. Subsidies are paid in two ways of cash and non-cash which efficacy of each of these methods requires their targeting. In this regard, considering the experience of other countries could be useful [2].

The payment of subsidies is running in our country as a supportive emprise for decades. Supporting vulnerable groups and avoiding increase in prices could be considered as the most fundamental objectives in payment of subsidies. Although, It was paid less attention to supporting the production and exports, providing food security and others. Aside from the increasing financial burden of the subsidies which in turn cause increasing in government's expenditures and budget deficits and inflation, continuation of this matter in recent decades has imposed other enormous costs on the economy of country and it was as an impediment for the full realization of this system. It seems that the current method of payment of subsidies has numerous problems. On the one hand, it has caused that the productivity in using resources came down and dissipation in consumption and waste of resources in production can be seen, investment led toward technology and methods for high-consumption of energy, financial burden of government severely increased which in turn is the reason for more dependency to oil revenues and inflation, on the other hand, it has result in inefficiency to support the vulnerable groups. In other words, improvement of income distribution has not been realized [3].

Finally, ascending size of implicit and explicit subsides turned the reform of subsides payment's system to an essential and inevitable measure for Iran's economy. Finally the law for subsides targeting has been implemented with too much struggles which it was the most important emprise of the government to meet and resolve the challenges of subsides in Iran's economy. On the one hand, the enforcement of the law for subsides targeting had have important achievements for Iran's economy which most notably are energy consumption pattern reform, income distribution improvement and increasing welfare of low-income groups [4].

On the other hand, one of the major issues of the country has been the matter of productivity. So that, they had investigated the role of productivity in increasing country's economic growth particularly in the 4th and 5th economic

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developments plans. Therefore, the impact of subsidies targeting is the reason of the present study which it is one of the major economic plans of government in recent years on the product factors productivity.

This research studies the impact of subsidies targeting on the product factors productivity by using model of Computable General Equilibrium (CGE). First, the CGE is described, and then the model is calibrated according to the economic information of Qazvin which it is summarized in a social accountancy matrix. In order to indicate the impact of subsidies targeting on the product factors productivity in Qazvin, the parameter related to this factor in the model has been changed and this change's impact will be calculated on the equilibrium level of variables; price and quantity in all markets. The indicator of marginal product function is used to assess the impact of this shock on the product factors productivity.

2. REVIEW OF LITERATURE

2.1. Subsidies

Subsidies are supportive tools that governments paid it to consumers and producers in order to protect them, and it usually forms high expenditures of the government budget. But those subsidies which are taken into account in the government budget; explicit subsidies, are just a small part of the total subsidies. Because there are other supports that are more than explicit subsidies and they never rebound in the government budget and they called implicit budget. So, the explicit budget deficit which is one of the economic problems of developing countries is always more than the number which they report[5].

Subsidies are paid to establish and adjust incomes distribution and the effects of market pressures, consumer subsidy, or to reduce production costs and to support manufacturer, production subsidy. The purposes of subsidy payment are optimal allocating of resources, price fixing, creating balance between supply and demand and redistribution of incomes. Therefore, subsidy is one of the supportive policies of government and it is a kind of government intervention to correct and guide the economic affairs. In addition to economic aspects of subsidy, they also have social and political roots. Because a wide range of society utilize them and these payments are tangible for people [5].

Finally, the ascending size of explicit and implicit subsidies had turned the reform of subsides payment's system to an essential and inevitable measure for Iran's economy. Finally the law for subsides targeting has been implemented with too much struggles which it was the most important emprise of the government to meet and resolve the challenges of subsides in Iran's economy. The enforcement of the law for subsides targeting had have important achievements for Iran's economy which most notably are energy consumption pattern reform, income distribution improvement and increasing welfare of low-income groups. It is expected that the production achievements of enforcement of the law for subsides targeting be appeared gradually in long-term [4].

2.1.1. Types of subsidy

Subsidies can be divided into five groups based on the government objectives, payment phases, how to classify in national accounts, how to reflect in national accounts and how to distribute. These categories are listed briefly in table 1.

Table 1. Types of subsidy									
The basis for categorizing subsidy	Types of subsidy								
Based on the government objectives	Economic, social, developmental, Political, cultural								
Based on the payment phases	Consumption, production, distribution, service, export								
Based on how to classify	Direct, indirect								
Based on how to reflect in national accounts	Explicit, implicit								
Based on how to distribute	Open subsidy, Subsidy per capita, targeted subsidy								

2.1.2. Subsidy payment's methods

- 2.1.2.1. Goods system
- 2.1.2.2. Coupon system
- 2.1.2.3. Public price system

2.1.2.4. Cash system

Cash subsidy can referred as a transfer payment from government to the various social groups which it is paid in two direct and indirect or contingent methods.

2.1.2.4.1. Direct cash subsidy

In direct cash subsidy method, cashes are paid to those who suffer from poverty if the subsidy doesn't allocate to them. This method is used more in developed countries and less in developing countries.

2.1.2.4.2. Indirect cash subsidy (contingent):

In the contingent cash subsidy payment method, subsidy is allocated to individual provided that they spend the received money for investment affairs in the field of children resources (such as attending in school) or regular use of preventive health services. In various countries, the use of this kind of subsidy is conducted in various ways which their common feature is that they are non-public and they dedicated only to certain households i.e. households with the income lower than the specified level of income. Another common feature of these plans is that payments are done subject to a behavioral condition. That is, in addition to that the households must have a certain level of income; they should accept

some predetermined functions. For example, in many countries, one of the most common predetermined functions is that families send their 6 to 15 years old children to school [2].

2.1.3. Foreign studies conducted on subsidies

Several studies on subsidy payment and its effects carried out by scholars of various countries which in this study are mentioned to a few of them briefly.

Reference [6] showed that targeting food subsidies by evaluating the effect of subsidized policies have been in favor of two low-income groups of rural families in Egypt, and the effects of subsidies' welfare will increase, if cancelation of subsidies be associated with transfer payment to the needy households.

Reference [7] has evaluated the economic situation and the results of liberalization of prices in Eastern European countries and it indicated that removing expensive industries and replacing imports in free conditions following liberalization of prices and abolition of subsidies will lead to mass unemployment and high inflation as it was observed in Hungary and Poland.

Reference [8] has studied the effects of increasing agricultural support on productivity and welfare of poor families in South Africa. In this reference, a general equilibrium simulation model from high to low is used. The mentioned model predicted that supporting agricultural products will have a minor effect on gross domestic products because exports and imports will reduce when household's real consumption decreases. Food production, other productions, trading and hotel managing would be damaging. Other industries receive little or no profit at all. The effect on households depends on their product factors and consumption pattern which the effect is extremely low and therefore, its impact on poverty reduction is also very low.

Reference [9] has examined the economical dynamic effects of government subsidy to promote hydrogen technology using a dynamic computational general equilibrium model on the economy of Korea. The results of the mentioned simulation model showed that the production, supply and demand for hydrogen will rise by increasing subsidy while production and demand for oil and electric materials will reduce. This policy has a positive effect on export, investment and gross domestic product; but, it has negative effect on the final consumption since part of the households' incomes transmitted to government to compensate for the subsidy payments.

2.2. Productivity

Today, due to the limitations of various product factors, there is a critical need for greater productivity whether in developed countries or in developing countries and economic experts and scholars have emphasized on the importance of the increasing productivity practically in the same way.

Evaluating the resources of countries' economic growth shows that in recent years, the industrialized countries have achieved to about 50% of their product growth through the promotion of productivity and it had a substantial contribution in economic growth in successful developing countries such as Malaysia.

Productivity is a comprehensive and general concept which its enhancement is discussed as an essential item to promote level of life, more welfare, tranquility and well-being of humans and it is considered as an essential goal for all countries in the world. On the other hand, productivity enhancement influences on society's economic indicators such as increasing production, reducing inflation, increasing level of employment and also competitiveness of countries. So many countries, particularly developing countries, seek to promote and develop productivity and thereby achieve to economic growth and development by doing extensive investment[10].

2.2.1. Productivity indicators

According to the report of National Iranian Productivity Organization, there are two productivity indicators: total and partial factor productivity. The added value is divided to the value of a certain input to calculate the partial productivity indicators of product factors. It is notable that to eliminate the effect of inflation

It is necessary that the added value is used in prices of the basic years. The partial productivity indicators of product factors along with the prices of factors have particular importance in explaining changes in the cost of labor and capital in product unit. In other words, these indicators are useful in demonstrating savings which are achieved through each of factors in product unit over time. So, productivity indicators of product factors are productivity indicators for labor and capital. *2.2.1.1.Labor productivity indicator*

In general, this indicator is gained by dividing added value to constant prices on the number of employees. If addition to the number of employees, the statistics of person-month work of employees or person-hour paid or done work be available, we can use these statistics instead of the number of employees. So we would achieve better results.

2.2.1.2. Capital Productivity indicator

This indicator is calculated by dividing added value to the existing value of capital (constant price).

For calculating this indicator, first added value and the stock value of capital is converted to the prices of the current year and the capital productivity is obtained by dividing added value to stock of capital.

2.2.2. Productivity measurement methods

According to economists, three following approach should use to calculate productivity [11].

a. Indicator approach

b. Production function approach

c. Input-output approach

We explain the production function approach, because just the mentioned approach is used in the present study to measure productivity.

2.2.2.1. Production function approach

This approach shows the technical relationship between inputs and resources, products or commodities. According to the theory of neoclassicists, product is a function of two major factors of labor and capital. In the following formula L is used for labor and K is used for capital.

TP=f(K,L)

This is a production function with two variable input or product factor. If K is constant, it can be written in form TP=f(L) which is a production function with a variable input.

(1)

(5)

(6)

Total product, Marginal product and Average product

Product value in each level of product factor is total product. Average product is total product divided by the product factor and marginal product is change in total product divided by change in product factor. The marginal product of each product factor is the final unit of that product factor. For example, marginal product of labor shows that how much the last unit of recruited labor adds to the total product [12].

$$AP_{L} = \frac{TP_{L}}{L}, MP_{L} = \frac{\Delta TP_{L}}{\Delta L} = \frac{dTP_{L}}{dL} = \text{Slope of the total product curve}$$
(2)

Elasticity of Product Factor

Elasticity of each product factors is the change percentage in total product divided by the change percentage in that product factor. For example, product elasticity of labor is total changes percentage($\% \triangle Q$) divided by labor changes percentage($\% \triangle L$).

$$E_{Q,L} = \frac{\%\Delta Q}{\%\Delta L} = \frac{\Delta Q}{\Delta L} \cdot \frac{L}{Q} = \frac{dQ}{dL} \cdot \frac{L}{Q} = \frac{MP_L}{AP_L}$$
(3)

Similarly, we can calculate product elasticity of capital (Ibid)

$$E_{\mathcal{Q},K} = \frac{\%\Delta Q}{\%\Delta K} = \frac{\Delta Q}{\Delta K} \cdot \frac{K}{Q} = \frac{dQ}{dK} \cdot \frac{K}{Q} = \frac{MP_K}{AP_K}$$
(4)

Besides the neoclassical production function, there are other functions that economists use them to determine the relationship between product and inputs. In this respect, Cobb-Douglas production function is a very common form which it is presented in 1928 [11].

$$Q = AK^{\alpha}L^{\beta}$$

In relation (5) α means power of capital is equal to productive elasticity of capital and β means power of labor is equal to productive elasticity of labor.

The goal of producer is maximizing the profit:

 $\pi = R - C$

Under the perfect competition (In the model used in this study, it is assumed that there is perfect competition condition in all markets), product price imposes from market to the producer. In other words, producer is the receiver of price, and also the factor prices in the factor market willbe given to the firm. So, under the primary conditions of maximizing, the profit is achieved as following:

$$\pi = p.y - wl - rk \tag{7}$$

$$\frac{\partial \pi}{\partial L} = \mathbf{P} \cdot \frac{\partial y}{\partial L} - W = 0 \Longrightarrow W = P \cdot M P_L \tag{8}$$

$$\frac{\partial \pi}{\partial K} = \mathbf{P} \cdot \frac{\partial y}{\partial K} - r = 0 \Longrightarrow r = P \cdot M P_k \tag{9}$$

As it can be seen, the amount of payment for each factor depends on the factor's productivity (Productivity is the amount of product factor effectiveness of production). But, two factors of price and marginal product.

Both above factors will contribute in increasing wages and nominal interest rate. If the rate of changes in factors price and rate of change in price can be calculated after an economic shock, the rate of change in productivity can be estimated according to relations (8) and (9).

2.2.3. Foreign studies on productivity

All articles and studies on economic topics show that many studies have devoted to the topic of productivity. In addition to explain the importance of productivity in economic, this matter mentions to the effort and serious attention of economic experts and theorists to provide useful solutions in order to promote the productivity. To do this, this section refers briefly to some of studies.

Reference [13] has examined the economic growth resources in countries and causes of difference in their productivity growth rate of product factor. For this purpose, statistical data of 88 countries were used between 1960 and 1994 and the results of this study showed that there is a negative correlation between physical capital and total productivity growth of factors.

Reference [14] hasstudied the effects of inflation on the industrial sectors of Greece. The mentioned results in this reference showed that inflation has a negative impact on the total productivity of product factors. So that, based on Friedman, inflation causes prices deviated from the real prices and getting price information would be difficult which ultimately leads to decrease in efficiency and degradation of productivity achievements.

Reference [15] has examined the global trend of product factors' total productivity in 87 countries between 1960 and 1990. Research results showed that in most countries, with the exception of Asian countries, from 1970 onwards, product factors' total productivity and also labor productivity has decreased.

Reference [16] has studied the productivity and economic growth for the Chilean economy during the period of 1980-2000 and ithas emphasized on the role of institutions and economic policies employed by governments in the process of economic growth and productivity improvement.

Reference [17] hasstudied the impact of foreign investment on the growth of Chinese industry sectors. Results of this study showed that foreign investment through facilitating the advancement in technology has a positive impact on the total productivity of product factors.

Reference [18] has studied the productive factor's accumulation rate, which it makes structural changes in industrializing economy. Results show that reallocating effects of labor can increase the valid efficiency of physical capital by 30 percent. Reference [19] has measured the product factors' total productivity in agriculture, industry, housing, transportation and service sectors. The results showed that TFP's annual growth rate of Taiwan economy was 3.01 during 1978-1999. Whereas, productivity growth rate of capital and labor during the studied period respectively was 46.2 and 12.8.

3. MATERIALS AND METHODS

3.1. Model of Computable General Equilibrium

One of the important issues in the computational modeling of general equilibrium is that micro and micro economic theories complementary to each other. So that, in documenting a grand theory, it is essential that the microeconomic bases of that theory be clear [20].

The great advantage of this approach is that it allows economists to analyze the political and exogenous factors effects within a framework of a system that it is associated with the all economic sectors and the whole world. The major advantage of the general equilibrium models compared to econometric models is that these models are not dependent on the time series data. Moreover, the rational and firm framework of general equilibrium models allows them to have more powerful analytical bases which they fully describe the optimizing behavior of economic agents, and in addition to the econometric models they are preferred to the input-output models[21].

Unlike the partial equilibrium models in which sectors are considered separate and under the subjective assumptions, the approach of computable general equilibrium models is that it covers all internal communication and interaction of economy including physical and monetary flow.

In the general equilibrium, the problem is that how is the relationship between the firms and households and how the price and number of goods and product factors affected by this relationship. Chart 1 shows a simple cycle. Households are owners of the product factors which they earn money by selling them in the factors market and they buy goods by this money in the goods market. On the other hand, firms produce the needed goods of market by using product factors [22].

CGE analysis uses the information before an economic (or social) shock and calculate economic parameters in a way that it be the fundamental equilibrium of the system's output, and then by shocking the system (changing one or more parameters) makes another equilibrium which it be comparable with the primary equilibrium. As it was said, in this approach, market mechanism works, and the output of system is not necessarily consistent with what could be derived in a field survey [22].



Chart 1: general equilibrium cycle, reference: AkbariMoqaddam, 2008

3.2.Social accountancy matrix

General equilibrium models have a unique structure. In these models, different economic institutions interact with each other and constitute the framework of economic structure. The social accountancy matrix is used to express the interactions

between different institutions which it has a certain extensive data framework. It allows defining the interactions between different institutions [23].

The social accountancy matrix is a square matrix and it shows a series of accounts which it describes the flow of incomes and costs between productive activities, product factors and institutions (social and economic institutions). This matrix demonstrates the monetary flows through columns (costs) and rows (incomes). Each account has a column and row and the sum of costs (columns) and receipts (rows) are equal. For example, the total income of an institution (a specified group of households) should be exactly equal to its costs [24].

Statistical sources used in this matrix are mainly input-output tables, national income statistics and statistics related to household's income and cost. Social accountancy matrix should have a special condition which it is used in the computable general equilibrium models. Standard CGE models use Standard SAM.

4.Description of Model

The model includes equations that many of them are non-linear. In the production and consumption sector, behavioral equations are derived from the primary conditions of optimality; in other words, maximizing productivity.

4.1. Product function

Product is a function of product factors, if the product factor (n) be $y = \{x_1, ..., x_n\}$ then the product function(y) would define as following $f(x) = \max\{y \ge 0/X \in V(y)\}$ in which V(y) is the product factor place.

CES1 function is one of the product functions which it is used more in applied researches.

This function is generally as follows:

$$y = \left(\sum_{i=1}^{n} \alpha x_{i}^{\rho}\right)^{\frac{1}{\rho}} \sum_{i=1}^{n} \alpha_{i} = 1$$
(10)

where $\rho \rightarrow 1$ This function converts to another certain function which all of its parameters could be derived from the SAM data. This function is called Cobb-Douglas production function in the economics' literature.

$$y = \prod_{i=1}^{n} x_i^{a_i} \sum_{i=1}^{n} \alpha_i = 1$$
(11)

If $\rho \rightarrow -\infty$ then this function converts to the product function with constant coefficients which it is called Leontief

production function in the economics' literature. $y = \min\{x_1, ..., x_n\}$ Two recent functions, Leontief and Cobb-Douglas functions are used at different levels of production in the present study.

4.2. Equilibrium in goods market and product factors

Equality of supply and demand maintains a balance in the market. As it explained in the previous section, supply and demand of goods and product factor could be derived from the consumer and producer's behavior. One of the model's constraints is the equality of supply and demand in order to guarantee the equilibrium condition in the market of goods and product factors.

4.3. Equations related to closing the model

Macroeconomic theories have different view about some of the variables. The disagreement between classical and Keynesian school is the variable of nominal wage. Keynesians based on the structure of economy and social institutions such as Ministry of labor and laws and labor unions believes in lack of flexibility of wages, at least toward decline. And classics according to their way of defining the government believe in total flexibility of nominal wage. It is effective for economic shocks whether the nominal wage be flexible or not, and it is necessary to consider it in the model by some constraints.

Since the purpose of this study is examining the long-term impact of subsidy shock on product factors productivity; therefore, the assumption of nominal wage flexibility seems logical and it has been considered to close the classics model.

4.4. Collecting information for calibrating the model

Examining the fluctuation in economic variables using optimal behavior of economic agents need to collect certain information. This information should be consistent with the economic theories in order to extract the constraints related to the closure of the model from it.

Extracting parameters of equations and constraints in a manner that simultaneously shows the solution for these equations in variables of the primary equilibrium model is called calibration. The information needed for calibrating the model is summarized in SAM.

Table 2 shows SAM used in this study which it has some sectors and it will be described subsequently.

4.5. Input-output sector

Input-output tables with a strong theoretical framework have a special position as an applied economic tool in economic analysis and planning. The importance of these tables is to extent that almost all countries at least one time have tried to get it. Input-output tables offer a comprehensive set of the most fundamental macroeconomic information of a country in detail. These tables indicate that what products are produced in the country and what range of activities is their

¹Constant Elasticity of Substitution

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producer. What is their kind of consumption and what is the consumption of each of institutions. Also, these tables suggest that how is the structure of country's imports and exports in terms of variety of goods and services. In any economy, cognition and evaluation of each of above information is the first step in the economic analysis [20].

Considering that extraction of regional input-output table requires high accurate information and it is very complex, it is necessary that this information be calculated in an appropriate way from national information. In regional analysis, using the space economy is one of the appropriate methods for this purpose. That is why the information of this sector has been obtained based on the dimensions of the space economy including the size of region's supplier sectors, the size of region's demander sectors compared to national, the size of specialized sectors and other factors like households consumption pattern, population, distance, etc. and the available documentations in Qazvin. The range of activities is divided into 11 main sectors in the social accountancy matrix of this study which are as following: agriculture, mining, food products, industries of textiles; clothing and tanning, industries of wood, paper and publishing, chemical products; coke and rubber, mineral non-metallic products, fundamental metals and steel products, other industries, buildings, water, electricity and gas, services.

			Table 2:	the present stuc	ły SAM			
	Range of activities	Goods	Product factors	Households	Government	Investment, Savings	Overseas	Total
Range of Activities		Total Value						
Goods	Input-output			Households' consumption	Government consumption	Investment	Export	
Product factors	Value added							
Households			Family's income through product factors		Direct subsidy to households			
Government	Indirect Subsidy	Import tax		Income tax				
Investment, Savings				Savings				
Overseas		Import						
Total								

4.6. The added value sector

Product factors in Qazvin are divided into labor and capital, and the added value is extracted according to the role of these factors in producing selected ranges of activities.

4.7. Indirect Subsidy

Since, the aim of this study is evaluating the shock of change from indirect to direct subsidies, it is required that the amount of government's indirect subsidy payment to the range of activities be considered in a table which this payment will reduce the total cost of these range of activities. So, the amount of government's indirect subsidy payment to the range of activities following the added value in the table has shown with minus sign that the sum of column for each of range of activities specifies the total created value including the indirect subsidy.

4.8. Households consumption and government sector

Goods and services produced by the various range of activities are used as the intermediate consumption that are shown in the input-output sector or they will be consumed by households and government sector which it is called final consumption.

Households' consumption is shown at the confluence of the column for households and the row for goods and services, and the government sector's consumption is shown at the confluence of the column for government and the row for goods and services.

4.9. Exports

As it explained in the previous section, the production of range of activities has two kinds of consumptions: intermediate and final. But, what remains after intermediate and final consumption from the value of these products will be used in two forms, either it will help to the cycle of domestic production in the form of investment (capital accumulation) or it will export to overseas.

In the social accountancy matrix used in this study, the column for overseas and the row for goods and services specify the amount of exports.

4.10. Imports

Imports of goods and services are listed in the column for goods and services and the row for overseas that government gets tariff through these imports and the tariff will form one of the government's incomes.

4.11. Households' income

Urban and rural households earn their income through two ways:

a. Through their own resources, including labor and capital,

b. Through direct subsidy

Households' income which is earned through product factors is listed in the column for product factors and the row for households, and the government's direct subsidy for households is listed in the row for households and the column for government. In fact, what is income for households (direct subsidy) includes in part of government's expenditures in the column for the government's expenditures.

4.12. Exports and Imports

Another special feature of social accountancy matrix in this study is separating exports to other provinces and imports from other provinces. The study also provides an estimation of domestic exports and imports (other provinces) through conventional methods of regional input-output matrix.

In the model, there isn't difference for province between imports from other provinces and overseas. In fact, since the subsidies targeting is simultaneously done in the whole country, increasing the price level inside the country and at the same time, increasing the households' income can cause to substitution of imported goods instead of internal goods and thus the goods which is imported to other provinces will transfer to Qazvin, as well. Therefore, in the model total of imports has not been outside the province and there is no reason for separation.

Since, the model is limited to Qazvin and Iran, this assumption is logical that changes in prices and production in Iran cannot affect the whole world.So, the level of price is assumed constant in overseas and changes in relative prices due to the rational behavior of consumers and the possibility of substitution between goods will lead to a different combination of imported and domestic goods' consumption.

5. Analysis of the results

The impact of change in subsidies payment from indirect to direct on product factors productivity, labor and capital productivity, has examined in various scenarios according to the present study's social accountancy matrix and the model which is written in the MPSGE.

5.1. Social Accountancy Matrix of this study

In social accountancy matrix of this study, the economy of Qazvinis divided into 11 productive sections which are as following: agriculture, mining, food products, industries of textiles; clothing and tanning, industries of wood; paper and publishing, chemical products; coke and rubber, mineral non-metallic products, fundamental metals and steel products, other industries, buildings, water, electricity and gas, services. The goods in each section are produced by combining the intermediate materials and added value. The Million Rials is the currency of each of accounts in the present matrix; that is, they are in a valuable form andthey obtain by multiplying the price in the value. The conventional solution to differentiate the price from value is that all prices for goods and product factors assumed as a unit. Thus, the valuable numbers will show the same physical quantities.

Table 3 shows the intermediate matrix which is estimated for Qazvin, that it is obtained by using input-output technique on the basis of 11 sections [25].

In this study, the product factors are divided into labor and capital. Table 4 shows the added value which produces labor and capital.

Table 5 is listed the amount of exports and imports in each section.

Table 6 is listed the amount and contribution of paid subsidy to the economic activities in Qazvin.

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	Agriculture	Mining	Food products	Industries of textiles; clothing and tanning	Industries of wood; paper and publishing	Chemical products; coke and rubber	Mineral non- metallic products	Fundamental metals and steel products	Other industries	Buildings, water, electricity and gas	Services
Agriculture	312504	240	172391	17936	1139	2191	424	81	449	663	113847
Mining	746	54	110	23	32	553	21420	13062	2123	4843	7604
Food products	70813	132	52966	1642	396	5265	2652	1704	8015	1788	303741
Industries of textiles; Clothing and tanning	13905	72	1483	158183	257	13246	2163	775	6427	1462	42120
Industries of Wood; paper and publishing	9780	29	6692	1121	15004	10732	10915	1774	9420	3558	70782
Chemical Products; Coke And Rubber	152538	1333	4731	40794	4665	258639	22156	5736	67008	12561	159740
Mineral Non-Metallic Products	4532	206	3303	452	444	7496	52414	5126	15493	77000	143580
Fundamentalmetals and Steel Products	8777	220	2054	1303	1456	4249	8513	23188	74774	27888	57915
Other Industries	10158	338	829	1538	2147	3595	7187	4809	393847	21228	175554
Buildings, Water, Electricity And Gas	30478	1199	2538	7427	2102	10771	34693	11157	9938	35203	930512
Services	55496	571	14163	8316	3757	18118	24916	14822	77526	34770	917945

Table3: The intermediate matrix of economic sections in C	Dazvin: all figures are in million Rials
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Reference: Ministry of Economic Affairs and Finance, 2012

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	Agriculture	Mining	Food Products	Industries Of Textiles; Clothing And Tanning	Industries Of Wood; Paper And Publishing	Chemical Products; Coke And Rubber	Mineral Non- Metallic Products	Fundamental Metals And Steel Products	Other Industries	Buildings, Water, Electricity And Gas	Services
Labor	2229843	26021	802243	493514	98679	1149985	865621	440506	3080473	1795502	9079163
Capital	3344765	30546	281869	191922	53135	541169	273354	197908	1197962	733374	5804711

Table 4: The contribution of each factor, labor and capital, from total added value in separated ranges of activities; all figures are in million Rials

Reference: Ministry of Economic Affairs and Finance, 2012

Table 5.the amount of exports and imports in Qazvin; all figures are in million Rials												
Description	Agriculture	Mining	Food Products	Industries Of Textiles; Clothing And Tanning	Industries Of Wood; Paper And Publishing	Chemical Products; Coke And Rubber	Mineral Non- Metallic Products	Fundamental Metals And Steel Products	Other Industries	Buildings, Water, Electricity And Gas	Services	
Imports	12133	16070	7679	145716	153806	245911	147355	243614	105820	-	-	
exports	75888	24769	85128	313533	5937	705955	251683	441788	406119	-	-	

Reference: Ministry of Economic Affairs and Finance, 2012

Table 6.the amount and contribution of paid subsidy to the economic activities in Qazvin

Sections	Contribution of intermediate	Contribution of added value –	The estimated amount of subsidy	Contribution of paid subsidy
	consumption – percent	percent	(Billion Rials)	– percent
Agriculture	14.1	17.0	694.1	10.1
Mining	0.04	0.17	0.9	0.01
Food products	10.0	3.3	217.2	3.2
industries of textiles; clothing and tanning	4.5	2.1	97.8	1.4
industries of wood; paper and publishing	1.3	0.5	28.2	0.4
chemical products; coke and rubber	14.0	5.2	304.1	4.4
mineral non-metallic products	4.5	3.5	97.8	1.4
fundamental metals and steel products	5.6	2.0	121.7	1.8
other industries	20.8	13.1	451.9	6.6
buildings, water, electricity and gas	11.1	7.7	241.1	3.5
Services	14.0	45.5	4633.5	67.2
Total	100.0	100.0	100.0	100.0

Reference: Ministry of Economic Affairs and Finance, 2012

Table 7. Absorption rate of indirect subsidy; all figures are in million Rials

	agriculture	mining	food products	industries of textiles;clothing and tanning	industries of wood; paper and publishing	chemical products; coke and rubber	mineral non- metallic products	fundamental metals and steel products	other industries	buildings, water, electricity and gas	services		
subsidy	694100	900	217200	97800	28200	304100	97800	121700	451900	241100	4633500		
Reference: Ministry of Economic Affairs and Finance, 2012													
	Table 8. Absorption of direct subsidy by urban and rural households; figures are in million Rials.												
			Decenint	•		Unhan hanashalda		Dunal hanasha	.l.d.				

Description	JEDAN HOUSEHOIUS	Kurai nousenoius
Direct subsidy	4685875	2205125

Reference: Ministry of Economic Affairs and Finance, 2012

According to the information obtained from the reports of secretariat for targeting subsidies plan, the ratio of paid subsidy to GDP is about 28 percent at the national level, and table 7 is extracted if this rate generalized to the provincial level. In the table, the contribution of each range of activities form the total subsidy is given in percent.

Now, it is necessary to emphasize that in this study, it is assumed that all phases of targeting subsidies will realize. In other words, the complete elimination of indirect subsidy and turn it into direct subsidy and pay it to urban and rural households.

If we assume that the central government distributes the subsidy totally and directly between urban and rural households, with regard to the combined population of the province, the rate of direct subsidy absorption by urban and rural households is calculated in table 8, which it will be non-competitive in the short-term.

5.2. Analysis of Software's Outputs

Analyses of examining the effects of indirect subsidy elimination, and pay it to urban and rural households in the form of direct subsidy and in the same amount, and the effect these changes on productivity of labor and capital has been studied in three stages.

In the first stage, the effects of indirect subsidy elimination on productivity of labor and capital factors were investigated. To do this, each section's indirect subsidy in the model was eliminated and then the results registered.

In the second stage, the effects of direct subsidy payment to households were examined. At this stage, like the previous method, the direct subsidy was applied to each section of the model.

In the third stage, in order to calculate the effects of the complete targeting subsidies namely, the elimination of indirect subsidy and pay the subsidies to households directly, the outcome of first two case was calculated, and by considering the rate of increasing the prices, productivity of each of labor and capital factors was calculated, and the results registered in tables 9 and 10. Charts 2 and 3 clearly indicate the results of complete targeting subsidies in productivity of labor and capital factors.

Table 9. Effects of subsidies targeting on productivity of labor factor												
Agriculture	Mining	Food Products	Industries Of Textile; Clothing And Tanning	Industries Of Wood; Paper And Publishing	Chemical Products; Coke And Rubber	Mineral Non- Metallic Products	Fundamental Metals And Steel Products	Other Industries	Buildings, Water, Electricity And Gas	Services		
-4	-3.8	-0.6	-3.4	-0.2	3.9	-51	5.6	5.7	6.1	-23		



Chart 2: Results of complete subsidies targeting on productivity of labor factor

Table 10. Effects of subsidies targeting on productivity of capital factor												
Agriculture	Mining	Food Products	Industries Of Textile; Clothing And Tanning	Industries Of Wood; Paper And Publishing	Chemical Products; Coke And Rubber	Mineral Non- Metallic Products	Fundamental Metals And Steel Products	Other Industries	Buildings, Water, Electricity And Gas	Services		
3	3.2	4.6	3.6	5	4.6	-50.3	7.1	6.4	6.8	-28.7		



Chart 3: Results of complete subsidies targeting on productivity of capital factor

6. Conclusion

The social accountancy matrix's table was formed by using input-output table and Qazvin's information and the primary equilibrium was achieved. Then, a new equilibrium was made and the data were updated by applying a politic shock which here is the elimination of indirect subsidies and paying the direct subsidies. This shock was applied to the model in order to applying the complete subsidies targeting to the model. The model of computable general equilibrium and MPSGE software was used to subsidies targeting.

6.1. The results of applying subsidies targeting policy on productivity of labor factor

According to the different sections of this study's social accountancy matrix, subsidies targeting on productivity of labor factor will have different effects on mentioned sections. Applying this policy will increase the productivity of labor in the following sections: chemical products; coke and rubber, fundamental metals and steel products, buildings, water, electricity and gas, and other industries.

Also, applying this policy will decrease the productivity of labor in other sections; they are agriculture, mining, food products, industries of textiles; clothing and tanning, industries of wood; paper and publishing, mineral non-metallic products and services.

6.2. The results of applying subsidies targeting on productivity of capital factor

According to the different sections of this study's social accountancy matrix, subsidies targeting on productivity of capital factor will have positive effects on the following sections: agriculture, mining, food products, industries of textiles; clothing and tanning, industries of wood; paper and publishing, chemical products; coke and rubber, fundamental metals and steel products, buildings, water, electricity and gas, and other industries. Also, the productivity of capital factor will have negative effects on two mineral non-metallic products and services sections.

Acknowledgment

I'm very grateful to Dr. AkbariMoqaddam, the vice president for student affairs in Islamic Azad University of Qazvin, for his efforts in conducting my MA thesis as the supervisor. This article is adopted from my MA thesis.

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