

The effect of increasing subsidies for health on household welfare using a general equilibrium model (CGE) in Iran

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Abstract: The subsidies program in Iran is one of the most important measures for economic and social justice through more attention and financial resources to low- poor society and balance between top and bottom decile. Purposivism of subsidies in Iran of action, the most important economic, order, realization of justice and correct use. According to the theory consumer, if the policy leads to increase national production and economic growth, and can, consequently, private consumption increase. Therefore, in this study under scenarios in a general equilibrium model, pay government to health part to increase (decrease), we will. And then, its impact on GDP and consumer obtains. For calibrate the model, social accounting matrix, Iran, in 2006, was used. The results show that increasing pay government, to health part, leading to a positive and significant increase in GDP and private consumption. According to our estimates, an increase of 5% and 10% in pay of Government, respectively leading to an increase of 5 and 42 percent of GDP and 3% and 20% of private consumption but to reduce these costs, not much impact on GDP and private consumption.

Key words: Health expenditures; Gross domestic product; Private consumption; Welfare; Computable general equilibrium model

1. Introduction

Since consumption makes up about two-thirds of GDP, fluctuations in consumption plays an important role in the creation of a recession or economic boom. Subsidies, is also one of the factors affecting consumption, which aims to improve the use of the poor and poverty reduction. Part of the subsidy in Iran subsidies Health (Health), are which in Iran to case of cash pay from the government to part above is done These subsidies, national production after stimulation, through economic growth, consumption and welfare of households affected and lead to an increase or decrease in poverty will be. If subsidies paid, able increase private consumption can be said that the program was effective enough to reduce poverty and improve the welfare of the main targets of subsidies is achieved; Therefore, in this study we examine this issue, the increase or decrease in subsidies paid to the health sector, private consumption to economic growth and to what extent, are affected. That does this, in a general equilibrium model for economy of Iran and the use of social accounting matrix (SAM) in 2006 than we do. Then, in second part of the theoretical foundations, the third part of the study, part fourth

model in part final results will be presented and discussed.

2. Theoretical basics

Also, Consumer spending is one of the most direct indicators measures of welfare of individuals and households that directly is affected by national income effect and its changes. If households are able to smooth their consumption of volatility using borrowing and lending, savings and capital market in that case, household's income flow has transience and sectional fluctuations. Furthermore, an increase in household income differences due to transient and sectional fluctuations and smooth flow of household consumption may lead to small changes in distribution of household welfare. According to Keynes's theory of consumption, government spending multiplier effect of national income will change and increase national income leads to increases consumption, savings, investment and employment. Based on consumer views, increase income (Permanent or transient) increases consumption. According to this principle, people's income will rise by paying cash subsidies and it is expected that consumption is raised due to cash subsidies. However, as we see in Figure 1 despite high marginal propensity to consume in Iran, increase consumption isn't equal to increase in

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national income that its reason is inflation and cost pressures caused by targeted subsidies project. According to Friedman's consumption theory, inflation reduces value of assets and reduced consumption (Rahmani, 2001).

In the following we describe theoretical basics of impact of government expenditures on health and economic growth. Human capital is one of the affecting factors on economic growth that health is presented as impact on quality of human force also, as a factor for accumulation human capital. Nowadays, health is not only as a component of human capital, but effect on growth as an independent variables and is more important than other components of human capital so Barro (1996) emphasizes that health is in higher explanation in economic growth than education. In contrast Aisa and Poyo expressed health expenditure leads to reducing GDP amount because of divert resources from productive investment (Aisa and Poyo, 2005)

Clark and Islam (2003) studied the effects of health costs on social welfare in two countries; Australia is a developed country and Thailand as a developing country during 1975-99. They used real income as criteria to measure social welfare and finally came to the conclusion that the effects of health government costs on economic growth of a country (Thailand) are more than its impact on economic growth in a developed country (Australia).

Chakeron (2009) researched nonlinear relationship between health care expenditure and national income of 17 OECD countries during years 1975-2003. The results of study show that there is a nonlinear relationship between national income and health expenditure in these countries also health services is an essential commodity in these countries.

Adobnemi et al. (2012) researched the relationship between government expenditures on

health and economic growth in Nigeria during years 1970-2009 using Co integration method. Their results report a relationship between these variables. As mentioned in the background, increased payments to the health department will have a positive effect on economic growth. Also, economic growth is one of the affecting factors on private consumption and according to consume views it is expected that private consumption that is indicators of people's welfare increased with growth in national income. We use of computable general equilibrium model (CGE) to test this hypothesis in Iran, and then explain used general equilibrium model.

3. Methodology

3.1. Accountable general equilibrium models

Accountable general equilibrium models consider balance simultaneously to all markets in economy. This model are widely used for assessment and analysis effects of policies and shocks on economy and has advantages in correlate various sectors of manufacturing, create connection between micro and macroeconomic levels and use of optimization principles of microeconomic behavior patterns at macro-economic level (Lafgryn, 2001).

Required data of general equilibrium models data is collected in a matrix called social accounting matrix. Technically SAM is a square matrix that account is represented by a row and a column in it. Used statistical base in this study is social accounting matrix of Iran in 2006. Table 1 shows details of inputs, production factors, activities and goods in the used model in this study. Details of model follow available data of calculated SAM table.

Table 1: Details of model

Collections	Subset
Activities	agriculture, oil, industry, building, services
Goods	agriculture, oil, industry, building, services, (Except Health), health
Production factors	work force, capital
Institutions	Urban households, rural households state, abroad world, central bank

Manufacturing activities produce product in model. These segments receive their income through selling their products and use of these incomes for payments to product institutions, means to purchase intermediate goods⁵ and paying wage of basic factors of production. Used production function in this model is directly related to production factors and these production factors play relationship role between production function of intermediate goods (Keshavarz hadad and Mortezaazadeh, 2010). Target of firms in each sector is maximize profit due to its function generate. Prices are flexible in goods market and are changed for transparency of markets in a competitive climate. Therefore, suppliers and demanders are price in this model (Tayebnia and Fooladi, 2010).

Households are divided into two categories, urban and rural and earn their income from their production factors.

Intermediate Input

Equation (1) shows Household's income of production factors and outside world and equation (2) shows total household income.

Household pay their income to buy goods, paying taxes and savings. Households buy goods through demand channel ordinary household for each goods. Demand function is calculated from maximization benefits according to budget constraint. Equation (3) shows use of household.

$$(1) \quad YF_{hf} = shry_{hf} (\overline{WF}_f \cdot WFDIST_{fa} \cdot QF_{fa} + tr_{f,row} \cdot EXR)$$

$$(2) YH_h = \sum_f YF_{hf} + \sum_i tr_{hi}$$

$$(3) QH_{ch} = \frac{\beta_{ch} \left(1 - \overline{MPS}_h\right) (1 - ty_h) YH_h}{PQ_c}$$

The government income also is obtained by receiving taxes and loans from abroad. This income is spent on consumption expenditure or transfer paying to other institutions. It is possible that the amount of government revenue is transferred to repay foreign loans to abroad. The rest of government revenue is saved that positive or negative of these savings presents surpluses or government budget deficits.

Other countries are engaged in domestic economy with paying funds as a loan or investment to government or financial market on the one hand and on the other hand receiving loan repayment, getting loan from domestic government or funding from financial markets.

In addition, other dimension of outside world interact with domestic economy is made with imports and exports of goods. Considered assumption in this model says that country's economy is small compared to the global economy so import and export is done by prices that are determined globally. Transferring income of workforce employed abroad into country and in the opposite direction, transferring income of foreigners' workforce who work in country to abroad show another dimension of domestic economy interaction with global economy. In this model, assumption of qualitative difference between domestically manufactured goods and imported goods is considered. On domestic demand, this qualitative difference is considered with assumption imperfect substitution between imports and domestically produced goods that are offered to inner market. It means if there is also imported type of every goods, total domestic demand for households, government consumption, investment demand and intermediate demand are supplied by composition of imports and domestically manufactured goods (in other words, composite products). Also, the optimal quantity demanded of these two product group depends on relative price. Similarly, incomplete transfer is assumed for domestic sales of domestically manufactured goods and their foreign sales (export). It means domestic manufacturer can supply or export manufactured goods to domestic markets. Also optimum amount of supply these two markets are determined by their relative price (Tayebnia and Fooladi, 2010).

Accumulated amount of every entity is equal to difference between income of entity and expenses of that entity. In this study, in general equilibrium model it is assumed that economic agents do not invest all their savings, but hold some of them as funds. These funds include cash and deposits, loans, foreign assets and other financial assets. Thus, the accumulation of each institution is equal to total savings institution and amount of his fixed financial

aspects of previous period. Economic institutions assign some of their accumulation to investment, as well as some is assigned to funds. In this model, applying for funding is accounted as trading demand of money. So, its amount is a relation of each entity income. Investment is done in different economic sectors after assigning accumulate of each institution to invest and cash. Total investment by institutions in each economic sector show the amount of total investment in that sector that this venture is formed using capital goods which comes from various sectors. We have full mobility of funds in money market. It means the amount of funds can come from abroad and in the same way amount of funds is transferred outside.

Relationships that were expressed for production, consumption and labor were section is obtained according to behavior of economic agents. But totally constraints that economy is faced to it in real world should be considered. These constraints may show itself in the behavior of economic agents. Real constraints which are considered in model are constraints related to goods market and production factor of investment and nominal bonds, current account balance, savings-investment balance and financial balance. Comprising marketable commodities is a compound of domestically produced goods that are sold in domestic markets and imported goods. Demand including final demand for consumes and capital goods, intermediate, inputs demands. The price changing of domestic products that are available in local markets causes domestic market reach to equilibrium while change in the value of imports balance imported goods market. It is assumed in market of primary factors that amount of supply of primary factors is constant. There is unemployed labor force in labor market and we are faced to assumption of perfect mobility of labor and wages fixed level, while the amount of labor is varied in each sector. Thus, changes in the amount of labor used in each sector balance labor market in that part. The amount of used capital for each part is fixed in capital market and capital is full in employment. Changes in operating capital lease (rent) leads to equalize this factor. Current account balance with outside world with assumption of constant foreign savings equilibrium by changing import, but in investment - savings account balance with assuming of constant marginal cost savings adjustment is in the amount of investment per institution that balance this account. Also in financial account, exit capital market balance this market with constant primary stock and foreign savings. This model is used for comparative static analysis and dynamic dimension isn't considered in model. Also, due to this point that capital reserves is assumed in model, resulting equilibrium model can be apply to a short-term balance at time. All equations are presented in Appendix 2.

Presented general equilibrium model are solved and stipulated using software package GAMS and social accounting data of table 2006. Presented

model of two types of parameters including share parameters that are derived directly from SAM table and behavioral parameters that are obtained from previous studies are presented all in Appendix 3. Generally, aim of calibration is those general equilibrium models that is obtained from social accounting matrix and is presented mathematically reproduce values in the social accounting matrix in the first perform.

4. Estimate models under different scenarios

4 scenarios have been defined to study changes effects of government health expenditures:

Table 2: Operational Research Scenario

Scenario1	Scenario2	Scenario3	Scenario4
Increased by %5	Increased by %10	Increased by %5	Increased by % 10

Source: Research Findings

According to Table 3, increasing health expenditures will increase GDP; also increasing these costs will increase private consumption that it may be noted as increase in consumer welfare, but reduce these expenses does not impact largely on GDP and private consumption.

Table 3: Results of different scenarios

		Private consumption	GDP
Basic Scenario	Quantity	412581	768475
Scenario 1 (Increased by 5%)	Quantity	424741	813645
	Percent of change	3 % increase	5 % increase
Scenario 2 (Increased by 10%)	Quantity	498249	1097462
	Percent of change	20 % increase	42 % increase
Scenario 3 (Reduced by 5%)	Quantity	409790	757981
	Percent of change	1 % reduction	2 % reduction
Scenario 4	Quantity	408743	753824
Reduced by 5%	Percent of changes	1% reduction	2% reduction

Source: findings of research

5. Discussion and conclusion

In this paper, using a static general equilibrium model, the effects pay changes in government health sector on GDP and private consumption were investigated. If health expenditures or to other words, government subsidizes to health part increased by 5%, 5% of national production rises and induced effects on private consumption will increase by 3%. If subsidies as high as 10% to 20% increase in national production and its impact on private consumption will increase by 42%. So the first two scenarios, subsidies to the health sector (health) to the satisfaction of private consumption raises. So we can say that the program was effective enough to reduce poverty and increase well-being is the primary purpose of subsidizing, achieves. in third and fourth scenarios that pay government (government subsidies), to Department of Health (HEALTH) has fallen; In both cases decreased by 5% and 10% reduction in GDP of one percent, and 2 percent reduction in consumption is obtained. The reduction of subsidies impact on economic growth and private consumption display. Although this result is favorable and indicate that the reduction of health care subsidies have a negative effect on consumption, but due to the positive effect of increasing the subsidy is highly desirable It is recommended that the next phases to achieve the goal of increasing access to goods and services and

to reduce poverty and improve the welfare, The amount pay to the health sector, to go up.

References

- Aisa, R., and Pueyo, F. (2005). Government Health Spending and Growth in a Model of Endogenous Longevity. *Economics Letters*, 90 (2), 249-253.
- Chakroun, M. (2009). Health care expenditure and GDP: An international panel smooth transition approach. *International Journal of Economics*, 4, 189-200
- Clarke, M., and Islam, S. (2003). Health Adjusted GDP Measures of the Relationship between Economic Growth, Health Outcomes and Social Welfare. CESifo Working Paper.
- Cullis, J. G., and West, P. A. (1979). *The Economics of Health: An Introduction*. New York University Press..
- Keshavarzhadad, Gholamreza; Mortezaazadeh, Hamed (2010), analysis effects of gasoline prices within accountable methodology of general equilibrium model, *economic Research*, 42-53-25
- Lofgren, H., Harris, R., and Robinson, S. (2002). A Standard Computable General Equilibrium (CGE) Model in GAMS. International Food Policy Research Institute (IFPRI).

Naderan, Elyas; Fooladi, Masouneh., Present a general equilibrium model researching effects of government spending on production , employment and household income .5 (4)

Odubunmi, A. S., Saka, J. O., and Mautin Oke, D. (2012). Testing the Cointegrating Relationship between Health Care Expenditure and Economic Growth in Nigeria. *International Journal of Economics and Finance* , 4 (11), 99-107.

Rahmani, Timor (2000), *Macroeconomic*, brothers publication, Vol 1

Soufi, Viter (2004), *Health Economics for developing countries "practical guide "*. (A. Pour Reza, translator) Tehran: Institute of Planning and Management in Higher Education and Research

Teibi, Komeil., Mesrinezhad, Shirin (2006), accountable methodology of general equilibrium model theory and application, *Quarterly economic studies (economic value)* , 3 (1) , 103-131