

Analysis of Growth and Income Multipliers based on SAM Model: The Case of Iran,India,Malaysia and Indonesia*

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Abstract

In this paper,we use standard SAM model to analyse the growth and income multipliers of Iran ,India ,Malaysia , and Indonesia within two type of potential economic policies. The former is visualized as a resource direction from production to growth and income. The latter starts from government current transfers to households. The latter policy appears to be more prevalent than the former in Iran. The main focus of this paper is to measure the potential impact of the two policies on the output and income of the above mentioned countries and then to address the following question:" What would be the potential impact of these policies on output and income in Iran and other countries and what prospects can one visualize for the Iranian economy?"

For this purpose ,we use SAMs of Iran(2001) ,India(1999) , Malaysia(2000) and Indonesia(2003).

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INTRODUCTION

In recent years, the Iranian government has opted for a kind of populist economic policy for social justice. The direction and transferring of resources to the poor section of society can be considered one of such economic policies. These resources are expected to be generated from the price reform in energy products which are highly subsidized. Estimates of the World Bank show that petroleum prices in Iran are only about 10% of the world prices and petroleum product subsidies are 18 percent of GDP (World Bank 2002) . Besides, in a recent Economic Reform Package of the government , we observed that ,the prices of energy sectors are planned to increase as follows : Petroleum 300% , Gasoline 1536 percent , Natural Gas 525 percent and Electricity 379 percent (Etamad Melli , 2008) . With respect to the potential generated resources from the reform in energy products , the question that immediately crops up is the direction of the resources. Part of these resources is to be directed to fill the heavy current financial budget deficit (2008-2009) and the remaining resources are expected to be transferred to the weaker section of society. In economic jargon, this kind of resource direction, i.e. transfer of resources from government to the different socio-economic groups of households is generally known as as a redistribution policy (Keuning , 1989) . To what extent the

potential impact of implementing such policy would be on growth and distribution is not clearly known to many analysts and policy makers in Iran. We maintain that by using a standard SAM – based quantity model, three types of potential economic policies with respect to resource direction on growth and distribution can be worked out : The direction of resources from production to growth and distribution , the direction of resources from government's transfer to different Socio-economic groups of households on growth and distribution and direction of resources of factor income from abroad on growth and distribution . Out of the three economic policies , two economic policies , i.e. resource direction from production to growth and distribution , and policy of government transfers to households are more prevalent and in fact are the center of on going debates between government circles and academicians . The degree of success of the former policy depends on external factors , i.e. political and economic ties one country has with the rest of the world , whereas the implementation of the latter economic policy appears to be less sensitive to external factors . These issues then raise the following question: “with respect to resource direction , what would be the potential impact of implementation of the above economic policies on growth and distribution in Iran?”

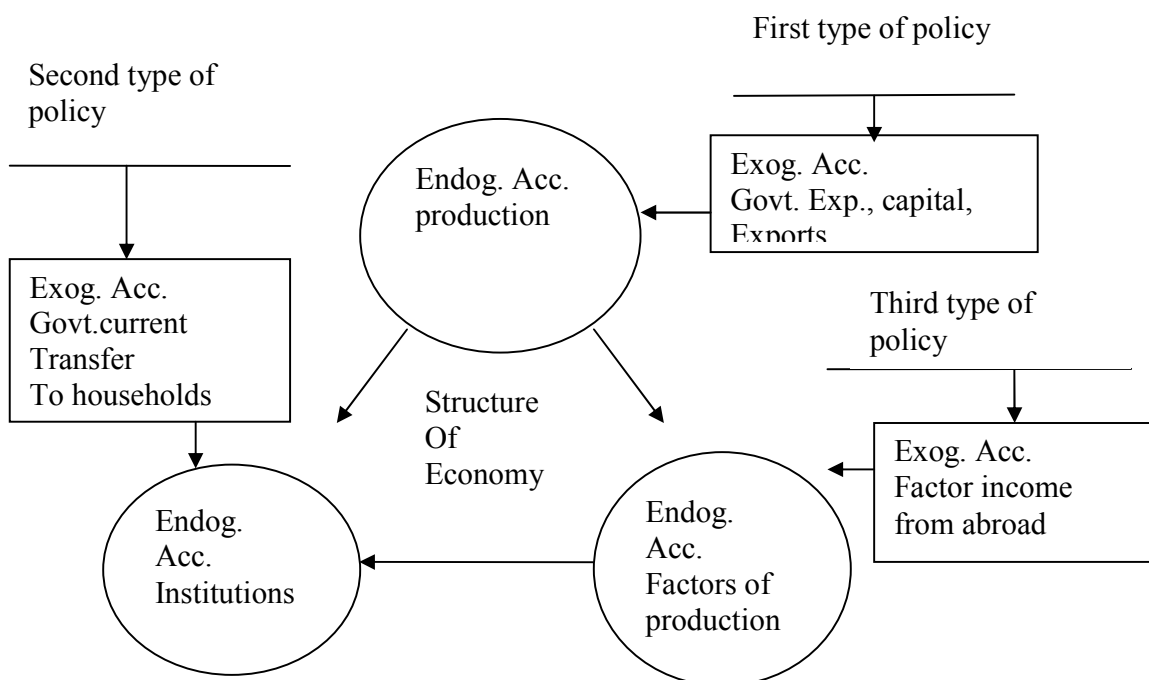
The core of this paper is to quantitatively analyse the posed question and then compare the results with the performance of other countries like India, Malaysia, and Indonesia. For this purpose, the contents of this paper are organized into four sections: In the first section, we briefly introduce the structure of SAM with special reference to the functioning of three types of economic policies. Data base of SAMS of Iran, Malaysia and Indonesia and their respective schemes of aggregation are presented in Section 2. In Section 3 we initially discuss the main features of SAMS of these countries in terms of size of endogenous and exogenous accounts, and then present the empirical results and analysis. The Summary and Conclusions will be given in the last section.

2- Structure of SAM and Functions of Three Types of Economic Policies

From the accounting point of view , a standard SAM encompasses five main accounts which are meaningfully interlinked with each other and hence portrays the functioning of a complete circular flow within an economy . These accounts are: Production account, Factor account, Institutional account, Capital account and the rest of world account. The primary step in modeling SAM is to classify endogenous and exogenous accounts. It has been customary to consider government, the rest of the world and capital accounts as

exogenous and production, factor and institutions as endogenous accounts. (Thorbecke , 2000, Khan, 2007) . Three endogenous accounts reveal the structure of the economy whereas exogenous accounts contain the exogenous variables and can represent the type of economic policy. Therefore, in terms of three endogenous accounts three types of economic policies can be distinguished. The following figure reveals the functioning of economic policy within The SAM framework.

Figure 1- Functioning of the three types of Economic Policies in Terms of Endogenous and Exogenous Accounts



The above figure shows the functioning of the Three types of policies. The rectangulars represent exogenous accounts and

circles indicate endogenous accounts of SAM, from which one can derive output and income multipliers. Each type of exogenous impulses in rectangulars represent a type of policy of resource direction. For example , the impact of demand impulses into production account is considered here as the first type of policy , The impact of transfer impulses to the different household groups is taken as the second type of policy and so on.

On the basis of the above diagram, the structure of a simplified macro SAM in terms of endogenous and exogenous accounts is shown in Table 1.

	Endo. Acc.				Exo. Acc.	Totals
	Production	Factors	Institutions		Govt, capital and Rest of The World	
Endo. Acc.	Production	A_{11}	0	A_{13}	x_1	y_1
	Factors	A_{21}	0	0	x_2	y_2
	Institution	0	A_{32}	A_{33}	x_3	y_3
Exo. Acc.	Residual balances					
Totals	y_1	y_2	y_3			

From the above Table , a distinction can be made between two types of exogenous impulses which in our context means two types

of policies : Demand injections into production account x_1 , and transfer injections into institutional account x_3 . The impact of either impulse can be traced to three types of endogenous accounts, y : Output by sectoral activity in production accounts s , earnings by factor , l , and income by household group , h . As we have already mentioned, the analysis shall be limited to the impact of the two types of economic policies, i.e. sectoral demands and institutional transfers on output (growth multipliers) and income by household (distributional multipliers) . This means that four parts of multiplier matrix can be derived from the following equations:

$$y = Ay + x \quad (1)$$

$$y = (I - A)^{-1} x = \text{Max} \quad (2)$$

Where M_a is the SAM multiplier matrix . In terms of three endogenous accounts elements of M_a contain nine parts of multiplier matrix , out of which four parts are used for further analysis

Table 2 shows functioning of four parts of multiplier matrix

Table 2 – Selected Multipliers for Further Analysis

Endogenous Accounts y	output,s	Factor	Types of Exogenous Impulses x	
			Injection to Production (outputs)	Transfers to Household h
Production (output,s) Factors			Ma,ss	Ma,sh
Income Household,H			Ma,sh	Ma,hh

From Table 2, we observe that the potential impact of the first type of economic policy, i.e. demand injection to production will simultaneously generate output multiplier, Ma,ss and income multiplier, Ma,sh . The potential impact of the second type of economic policy will also provide output multiplier Ma,hs and income multiplier, Ma,hh . The main difference between the potential impact of the two types of policy on growth and distribution is that, the first starts from production side and then to factor income and finally to income of household. The second

begins from institutional income transfers and then to the sectoral consumption of households. The four parts of multiplier matrix within two types of policies have been worked out for Iran, India, Malaysia and Indonesia.

3-Data Base and Empirical Analysis

3.1-Data

For the estimation of growth and income multipliers we have used 2001 SAM of Iran (Banouei,2003), 1999 SAM of India (Pradhan , Saluja and Singh, 2006), 2000 SAM of Malaysia (Saari , Dietzenbacher and Los, 2007) [1] and 2003 SAM of Indonesia (Yusuf , 2006). As these SAMS use different classifications in production , factors and institutional accounts , and in order to make them comparable , we aggregated all the SAMS into the following classification schemes: All the sectors in the production account are classified into three aggregate sectors: primary sector (agriculture and mining), secondary sector (industries, water ,electricity, gas, and construction) and tertiary sector (include all service activities). Factor account is classified into two components: labour income and operational surplus. Households are grouped into rural and urban households. All SAMS are at current prices and countries were selected according to the availability of SAMS.

3-1-Empirical Results and Analysis

Before presenting the empirical results, a few figures are helpful in giving a quick insight into the empirics of difference performance of these countries . One is the size of the countries. The following Table in gives the size of countries in terms of land , population and GDP.

Table 4- Size of the countries in terms of Land , Population and GDP.

	Land Sq.km	Population (million)	GDP (Bilion US) \$	GDP percapita Us \$
Iran	1745	70.1	217.9	3108
India	3287	1109.2	918.8	828
Malaysia	329	26.1	150.7	5774
Indonesia	1904	22.3	365	1638

Source: World Bank Report (2007)

From the above Table, we can make the following general observations. Largest and smallest countries are India and Malaysia respectively. Iran and Indonesia are oil producing whereas India and Malaysia are non-oil countries.

The size of the multiplier depends on some degree on the level of aggregation. Since we have used a uniform aggregation , this argument is less relevant to the compared countries. Last but not the least, the size of the multiplier of SAM based model depends on the choice of

exogenous and endogenous variables. In this case , we expect that the larger country has a larger size of endogenous account and therefore relatively less leakages (Dietzenbacher ,et,a1., 1993). On the basis of the SAMS of the concerned countries studied we have estimated the percentage shares of endogenous and exogenous accounts as shown below in the Table.

Table 5-% Shares of Endogenous and Exogenous Accounts

Countries	Endogenous Accounts	Exogenous Accounts	Totals
Iran (2001)	82	18	100
India (1999)	85	15	100
Malaysia (2000)	67	33	100
Indonesia (2003)	83	17	100

3-1-1- Potential Impact of the First Type of Economic Policy on Growth and Distribution

To start with , the growth multiplier effect of final demand injections on sectoral output multipliers , $M_{a,ss}$ and income multipliers, $M_{a,hs}$ of the four countries in question have been estimated and results shown in Table 6:

Table 6- Growth and income multipliers of the countries under the First Type of Policy.

Countries	Growth Multipliers (1)	Income Multipliers (2)	Ratio of income to output multiplier (3)
Iran (2001)	2.56	1.11	0.42
India (1999)	3.53	1.58	0.45
Malaysia (2000)	2.54	1.12	0.44
Indonesia (2003)	3.20	1.14	0.36

From the results of Table 6, we can make the following observations:

1) The figures in columns (1) and (2) show average output and income multipliers due to one unit increase in demand injection of a country. For example, the results for Iran show that on average, a demand injection in sectors of, say one billion rials has a multiplier effect on output of 2.56 billion Rls.

2) Looking into the results of Column 3 Table 6, we observe that, economic performance of India and Malaysia is better than Iran and Indonesia and, Iran stands better as compared to Indonesia. One way of interpreting economic performance is the degree of efficiency in use of factor of production. Therefore, bigger ratio of income multiplier to growth multiplier for two reasons can be taken as a proxy for the relevant concept of efficiency use of factor of production. First of all, earned income is closer to the efficiency notion of value added than the gross output, and secondly, earned income by household groups is a better indicator of social welfare than group output.

3-1-2- Potential Impact of the Second Type of Policy on Growth and Distribution

Attention can now be directed to the multiplier effects of transfer injections. We have calculated the potential impact of government

current transfer to households on the output and income multipliers ($M_{o,sh}$ and $M_{a,hh}$) of the countries in question and the Results are shown in Table 7.

Table 7 – Growth and Income Multipliers of the Countries under The Second Type of Policy.

countries	Growth Multiplier (1)	Income Multipliers (2)	Ratio of income multiplier to growth multiplier (3)
Iran (2001)	1.27	1.81	1.43
India (2000)	1.70	1.45	0.85
Malaysia (2000)	1.39	1.25	0.89
Indonesia (2003)	1.61	1.79	1.11

From the above results , we can make the following observations :
One , the ratio of income multiplier to output multiplier under the second type of policy is highest in Iran , 1.43 unit , followed by Indonesia with 1.11 unit . India has the lowest ratio 0.85 unit followed by Malaysia with 0.89 unit. Two , this outcome can be interpreted to mean that the transfer payments to household groups in Iran occur in an economy with relatively less intensive and extensive circular flow and more emphasis on the direct rather than indirect effects. Whereas other countries like India and Malaysia in contrast allow the transfer payment to be turned over more intensively and extensively . Three , to highlight the above observation , the results in the case of Iran show that the potential impact of such policy , permits more income than output and hence giving the ratio more than one , whereas the results for the other countries are less than one , meaning thereby that , the potential impact of such a policy for the other countries generates relatively more output than income . Notice that the ratio for Indonesia is also more than one . The above observations , provide us with the following important question :

" Is it possible to establish a relationship between the higher income to output multiplier and leakages in terms of imports? "

To answer the above question , one needs to estimate income multipliers generated under two types of policies for each endogenous percentage point of the respective countries . The results are shown in Table 8.

Table 8 – Income Multiplier for Each Endogenous Percentage Point under Two Types of policies.

countries	Share of Endogenous Accounts Percentage (1)	Income Multiplier Under The First Type of Policy (2)	Income Multiplier For each Percentage Point (3)	Income Multiplier Under The Second Type Of Policy (4)	Income Multiplier For each Percentage Point (5)
Iran (2001)	82	1.11	0.014 (0.036)*	1.81	0.022 (0.015)*
India (1999)	85	1.58	0.019 (0.042)	1.45	0.017 (0.020)
Malaysia (2000)	67	1.12	0.017 (0.039)	1.25	0.017 (0.022)
Indonesia (2003)	83	1.14	0.013 (0.038)	1.79	0.021 (0.019)

Figures in brackets are Output Multipliers for each percentage point of endogenous account. under the two type of policies.

The figures in Table 8 are organized in five columns. Columns 1, 2, and 4 show the percentage shares of endogenous accounts average income multipliers generated under the first and second type of policies for the respective countries. Columns 3 and 5 represents the income multipliers for each percentage point of endogenous accounts of the concerned countries. On the basis of the results of Table 8, we can make the following observations.

One: – Multiplier incomes for each percentage point of endogenous accounts of India and then Malaysia under the first type of policy are better than Iran and Indonesia. Besides, we observe that there exists a direct relationship between income multipliers and output multiplier for each percentage point of endogenous account. The income and output multipliers for each percentage point of endogenous account for India are 0.019 and 0.042 whereas for Malaysia are 0.017 and 0.039 respectively.

Two : There is no such direct relationship between income and output multipliers for each percentage point of endogenous accounts of countries like Iran and Indonesia. For example , in the case of Iran, we observe that each percentage point of exogenous account gives an income multiplier of 0.014 and output multiplier of 0.036 , whereas similar figures for Indonesia are 0.013 and 0.038.

Three : looking into the results of income and output multipliers for each percentage point of endogenous account under the second type of policy we find that , as compared to the other countries, income and output multipliers for each percentage point of endogenous account in Iran is highest accompanied by lowest output multiplier, 0.022 and 0.015 respectively. The similar figures for Indonesia are 0.021 and 0.019. India and Indonesia reveal a contrasting picture, i.e. the income multipliers for each percentage point of endogenous account of these countries are less than their corresponding output multipliers: 0.017 and 0.020 for India, and 0.017 and 0.022 for Malaysia. The policy implications of the above results and observations in the Iranian case would suggest that, the potential impact of resource direction i.e. government current transfer to households generates more income and less output, the consequence of which would exacerbate the current two digit inflation and current two digit unemployment problems in Iran.

4- Concluding Remarks

The Iranian government has opted for a kind of populist economic policy for social justice. This policy is expected to be implemented by transferring of resources to the households. The potential impact of such policy on growth and income is not clearly known to policy makers and analysts in Iran. To quantify

the impact of such a policy, we first of all distinguish two types of economic policies:

The first type is the direction of resources from production to growth and distribution, and the second type of policy is known as government current transfers to households and its impact on income and growth . Based on the above policies , we then asked the following question : " What would be the potential impact of implementation of the two types of policy on growth and income in Iran? And as compared to the other countries, what prospects one can visualize for the Iranian economy?"

To quantify the above question, we have used SAM of Iran (2001), India (1999), Malaysia (2000) and Indonesia (2003).

The results with respect to the potential impact of implementing the first type of economic policy on growth and income multipliers reveal that economic performance of India and Malaysia are better than Iran and Indonesia . The results also show that the Iranian economy fares better than The Indonesian economy . The criteria for better and worse performance of the economy is measured as the ratio of income and output multipliers. These ratios for India and Malaysia are 0.45 and 0.44, and for Iran and Indonesia are 0.42 and 0.36 respectively.

Turning now to the potential impact of implementing the second type of policy, i.e. government current transfers to households on

growth and income multipliers we find that output multipliers of India and Malaysia are more than the corresponding income multipliers and the ratio of income to output multipliers are less than one. (0.89 for Malaysia and 0.85 for India) . Iran and Indonesia reveal a contrasting picture . We find that the income to output multipliers of these countries are above one and this ratio for Iran is higher than Indonesia. (1.43 for Iran and 1.11 for Indonesia respectively).

Keeping in mind the main question posed in our paper and also taking into account the existing two digit inflation and unemployment facing the Iranian economy , the findings of this paper suggest that the implementation of the first type of policy will be more favourable in tackling current problems than the second type of policy.

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