The Place of Agriculture in the National Economy, with an Emphasis on Productivity and Employment in Various Sectors of the Iranian Economy

Mojahed Babapour¹
Ph.D. in Economics from the State University of Baku (Azerbaijan), Iran

*Corresponding author: Mojahed Babapour, Ph.D. in Economics from the State University of Baku (Azerbaijan), Iran

Annotation

According to the results of balanced and unbalanced growth theories and the results of economists and development theorists research, the two sectors of industry and agriculture in addition to economic growth of the country have accelerated growth in each other and according to the five-year plans of the country periodically agricultural sectors and industry is considered to be the leading sector, and given the extent to which these two sectors are impacting other sectors of the economy, they are key sectors for resource allocation. Therefore, in this study we will investigate the position of agriculture in the national economy with emphasis on the production and employment potential of different economic sectors of Iran. The methodology of this research is descriptive and empirical and has been done by input-output model and by analysing technical coefficients, increasing production coefficients and increasing employment coefficients.

The results show that among the agricultural subdivisions, the fishing sector has the most direct relationship with the other sectors. Also, by merging the subgroups of the agricultural sector, it is revealed that the agricultural sector has the most direct relationship with the industrial sector with technical coefficients of 0.071. Due to the mutual relationship between the agricultural and industry sectors, they play a major role in the growth of each other, in addition to the major economic development and growth of the country. From a policy perspective, among the agricultural subdivisions, the fishing and livestock sectors have a higher coefficient of production than other agricultural subdivisions. In terms of increased production, investment in these two sectors is preferable to other agricultural sub-sectors. In addition, job creation should focus on the growth of forestry and logging sectors and livestock products, which have a higher employment coefficient than other agricultural sub-sectors.

Keywords: Agriculture; National Economy; Production; Employment; Investment

Introduction

As regards the existence of developed and pioneer agriculture sector is considered essential in economic developing and in any case the development of the agricultural sector is a precondition for economic development. Its decisive role in the food supply in one hand and creating a market for industrial goods and the supply of proposed inputs in complementary industries on the other hand, also this mutual relationship with other sectors in the industrial development of the country is considered a good source. With due attention to above mentioned cases, considering the role and place of agriculture sector with other sectors always have been considerable. The issue that how much agriculture sector uses the products of other sectors, vice versa how much other sectors use the products of this section is the subject that has always been concern of economic policy. In addition, knowledge of the impact of changes in macroeconomic policy variables in agriculture on output and employment in the sector as well as other parts of this section has a special place. Hence, in order to determine the role and place of agricultural sector we can raise the following questions:

1. How much is the interaction of agricultural sector with other sectors?

2. How much a change in any component of the policy variables in agriculture (household final consumption, government consumption, investment and exports) influences on production of this section and other sections?

3. How much a change in any component of the...
policy variables agricultural (household final consumption, government consumption, investment and exports) effect on this sector and other sectors employment?

To answer these questions, the first part of the theoretical input-output model is given and the second part is devoted to the basic data used, and in the last part we will analysis of the input-output model with using input-output table in 2018.

**Input-Output Model**

Although in economic literature, the analysis of input-output is known with name of Wassily Leontief Russian-American economist, yet its roots should be sought in the table of doctor Kene and Walras general equilibrium theory.

The input-output table that is structured on the basis of input-output analysis, is presented by Leontief for the U.S. economy for the first time. Since in this table, the intersection between sectors in economy was detailed as possible, for the first time studying the structure of the components of a financial system was possible. Therefore, this model was considered by many countries. The reasons for the wide acceptance of this model should be sought in providing features such as the multi-faceted picture of the economy and its diverse applications in economic planning and analysis. Capabilities of the model were developed in many countries and placed on their agendas. From the theoretical point the input-output table usually starts from production relation. This relationship can be expressed as follows:

\[
X = Z + F
\]

Equation (1) shows that the total GDP (X) is composed of two components. Intermediate demand (Zi) and final demand (F). In other words, part of the total GDP, and the remaining part is the final production consumed by institutions (such as family or local or central government) or are exported to abroad. i is also a single column vector. Above equation shows the balance between production level. If the (Zi) is ignored in the above equation, the total production of final demand is guaranteed automatically, which will be equal to the total income. In fact, it is one of the principles of national accounting systems. But one of the main characteristics of input-output tables in comparison with national accounting system is its sensitivity to economic structure; especially to analysis of position of different economic sectors. Thus, according to available data, equation (1) can be related to a number of different economic sectors in the country and thus obtained the balance between production of each part of the equation (1). In this case, it is assumed that the economy is in two parts, according to the assumption of equation (1) can be expressed as follows:

\[
x_i = \sum_{j=1}^{2} Z_{ij} + f_i
\]

Equation (2) yields the i th level of the emerges. (i, j = 1, 2) supposing the two parts of the economy, (X) of the matrix of production

\[
X = \begin{bmatrix}
x_1 \\ x_2 
\end{bmatrix}
\]

And (Z) indicates interface exchanges between parts of the economy

\[
Z = \begin{bmatrix}
Z_{11} & Z_{12} \\ Z_{21} & Z_{22}
\end{bmatrix}
\]

(F) the final demand matrix.

\[
F = \begin{bmatrix}
f_1 \\ f_2
\end{bmatrix}
\]

If equation (2) was expressed in the form of a matrix, we can express the production balance between the two parts separately.

\[
\begin{bmatrix}
x_1 \\ x_2
\end{bmatrix} = \begin{bmatrix}
Z_{11} & Z_{12} \\ Z_{21} & Z_{22}
\end{bmatrix} \begin{bmatrix} 1 \\ 1
\end{bmatrix} + \begin{bmatrix} f_1 \\ f_2
\end{bmatrix}
\]

A productive balance sector one

\[
x_1 = \sum_{j=1}^{2} Z_{1j} + f_1
\]

A productive balance sector two

\[
x_2 = \sum_{j=1}^{2} Z_{2j} + f_2
\]

If on the basis on inter-sectoral transaction matrix interfaces, technical coefficients of production or direct data values are calculated, the first question can be answered. For this purpose, it is necessary to divide the direct coefficients of the division elements of intermediate exchanges between the part (Zij) on production of jth (Xj) is obtained as follows:

\[
a_j = \frac{Z_{ij}}{x_j} \Rightarrow A = a_j = Z(\hat{x})^{-1}
\]
Mark "\(^\wedge\)" is a diagonal matrix.

Equation (4) shows that for every one-unit increase in production of \(j\)th, \((X_j)\) the amount of goods and services directly to the section that \(i\) have used in their production processes. For both the direct coefficient matrix is computed as follows:

\[
A = \begin{bmatrix}
  a_{11} & a_{12} \\
  a_{21} & a_{22}
\end{bmatrix}
\]

If equation (4) be replaced in equation (3), the new relationship between the level of production is achieved as follows:

\[
X = X + F
\]

Which according to equation (4) we have. Also, equation (6) can be expressed as follows:

\[
X - X = F
\]

\[
I - A \ X = F
\]

\[
(7) \ X = I - A^{-1} F
\]

\(F\) in equation (7) is an exogenous variable and its components are household final consumption, government final consumption, investment, exports, and so on. These factors are considered in macroeconomic variables and policy variables through which planners and policy makers can in directed questions attempt to policy. Output multiplier matrix shows the production that emerges direct and indirect intermediate transactions between different sectors of the economy. Furthermore, an inverse matrix which describe the structure of the economy is considered stable in short term and planning of the economy. \(X\) indicates the dependent variable and the different economic sectors to GDP that it should be calculated based on the variables \(F\) and input-output multiplier [2,3].

**Effectiveness Analysis**

This type of analysis and associated models are essentially used in short-term policies and programs. The basis of these models is multiplier that is used in the form of the multiplier output to the multiplier, income multiplier and employment multiplier.

**Production Effectiveness**

Using equation (7) can answer to the theoretical aspects of the second question. For this purpose, equation (7) is expressed as follows:

\[
(8) \ \Delta x_i = R_j \Delta f_i
\]

In that

\[
R_j = I - A^{-1}
\]

Equation (8) shows that policy changes in each variable and each of its constituent components (such as changes in household final consumption, government consumption, investment and exports) in each of the economic sectors (policy development implemented in each category) how will have the effect of increasing total production and the impact of mentioned policies on which sectors will lead to further increase production.

To response to the above question, then equation (8) is expressed in matrix form.

\[
\begin{bmatrix}
\Delta x_1 \\
\Delta x_2
\end{bmatrix} =
\begin{bmatrix}
R_1 & R_2 \\
R_2 & R_2
\end{bmatrix}
\begin{bmatrix}
\Delta f_1 \\
\Delta f_2
\end{bmatrix}
\]

\[
(9) \ x_i^* = (I - A)^{-1} f_i^*
\]

In the above equation represents macroeconomic policy variables of the predicted target year. Multipliers production or economic structure predictions that are consistently in the mid-term or fixed-term planning is considered and is the gross production value in predicting the destination.

**Effectiveness of Employment**

Consequences of policy development and spreading the sectors are not limited to increase production sectors which of sectors in the economy can create more production but the consequences can be associated with employment in the sector. It can be used to determine which of the sectors of the economy can create more direct and indirect jobs. These aspects are discussed in the answer to the third question.

To investigate these aspects, it is first necessary to calculate the coefficients of sectors direct employment. The coefficient is obtained by division of the number of employees in each sector to GDP.

\[
(11) \ \ell_j = \frac{L_j}{x_j} \Rightarrow L_j = \hat{L}_i x_j \Rightarrow L = \hat{\ell} x
\]

In the equation (11), \(L_j\) number of professions of \(j\)th sector, \(\ell_j\) direct coefficient of employment of \(j\)th sector, \(X_j\) the component of GDP of \(j\)th sector and mark "\(^\wedge\)" is a diagonal matrix.
By substituting equation (11) in equation (7) a new relationship is achieved that links between the constituent components and final demand (macro policy variables) with the structure of the economy and employment.

\[ L = \hat{I}(I - A)^{-1} F \]

In that equation \( F \) and its component reveal the variables in the macro policy at the national level of it, reveal the employment multiplier matrix and \( L \) shows the number of workers : the relation (12) can be used for politic purpose on the power of the employment in sectors. The use of policy regarding equation as following procedure:

\[ \Delta L_i = E_j \Delta F_j \]

In that

\[ E = \hat{I}(I - A)^{-1} \]

And \( E \) is known to the increasing coefficient matrix of employment.

Equation (12) shows that changes in each policy variable and each of its components (such as changes in household final consumption, government consumption, investment and exports) in each of the sectors of the economy create jobs directly and indirectly in whole new economy and power of employment (direct and indirect jobs were created) resulted by policies caused by which sectors are more developed.

\[ \Delta L_i = E_i \Delta F_i \]

predicted macroeconomic policy variables and predicted employment rates (individual-new jobs) in the destination year [1].

Input-Output table from a Statistical Standpoint

Input-output table in 2018 is provided by the central bank in 56 section and on the basis of based price. In this investigation with due attention to existing limitation in employment data, this table was aggregated to this restriction in 14 sections (see Appendix 1).

This table consists of the schedule of activities through three zones, final demand and value added. The first row shows the input-output or demand of agricultural and horticultural products and first column shows the input-output of agricultural and horticultural products that its output and input are equal to each other. Demand for crops and horticulture sectors is 114148163 million Riyals that 38813148 million Riyals that is request of Middleman and the rest (75335315 Riyals) is equal to final demand. Also because it costs 24366866 Million Riyals value is equal to 89781598. The rest of it (75335315 Riyals) is equal to final demand. Also middlemen costs are 24366866 Million Riyals and value added is equal to 89781598 Million Riyals. Other rows and columns are interpreted in the same manner.

In 2018 the total output of sectors is equal to 2,170,393,574 million Riyals that 835,611,730 million Riyals is cost of middlemen sectors. The value of GDP in this year is equal to 1334781844 Million Riyals and equal the sum of added value or final demand of sectors.

The important point is that import column figures are all negative. It is for this reason that the import causes the going out of money from economic cycle, and hence be considered the leakage of money. Therefore, the final demand figure is negative, also this year the change in depot inventories of mining sector is negative. However, the other components of final demand due to the influx of money in economic circulation have positive values [4].

Analysis of Input-Output Model Result

In the previous section theoretical input-output model and its application in the field of production and employment was provided. To operate this model, in this section we analyze the results of 2018 input-output table. In order to this purpose, we will analyze the structure of the economy in 2018 using the technical coefficients matrix and then analysis the output increasing multipliers and at the final we will analysis employment increasing multipliers.

Analysis of Technical Coefficients

A prominent feature of the input-output model is power of this model in analyze of structure of the economy production. The technical coefficients matrix is the most important input-output analysis. Matrix of technical coefficients is resulted from division of the mean costs on portion of the output in the same part. This matrix shows the contribution of each sector to buy goods and services from other sectors. Actually, this matrix shows the sectors cost structure. Technical coefficients matrix is given in Appendix (2). For example, the first column of the matrix represents that from the one Riyal input in gardening and agricultural crops, 0.041 Riyals is paid to buy the same products. In other words, for 1000 Riyals spent on purchases of intermediate output of this sector 41 Riyals is paid to Middleman and the rest (75335315 Riyals) is equal to final demand. Also

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### DOI:
10.46718/JBGSR.2021.07.000186
Appendix 2: Technical Coefficients Matrix.

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<th>11</th>
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<th>14</th>
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<td>0.041</td>
<td>0.151</td>
<td>0.000</td>
<td>0.002</td>
<td>0.000</td>
<td>0.049</td>
<td>0.09</td>
<td>0.000</td>
<td>0.000</td>
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<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
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<td>0.008</td>
<td>0.02</td>
<td>0.000</td>
<td>0.000</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
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<td>0.000</td>
<td>0.016</td>
<td>0.005</td>
<td>0.000</td>
<td>0.002</td>
<td>0.03</td>
<td>0.000</td>
<td>0.000</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<td>Fishery products</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.067</td>
<td>0.000</td>
<td>0.001</td>
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<td>0.002</td>
<td>0.001</td>
<td>0.001</td>
<td>0.053</td>
<td>0.01</td>
<td>0.000</td>
<td>0.000</td>
<td>0.009</td>
<td>0.005</td>
<td>0.000</td>
<td>0.005</td>
<td>0.000</td>
</tr>
<tr>
<td>Water, electricity and gas</td>
<td>0.060</td>
<td>0.099</td>
<td>0.034</td>
<td>0.193</td>
<td>0.004</td>
<td>0.366</td>
<td>0.10</td>
<td>0.472</td>
<td>0.115</td>
<td>0.187</td>
<td>0.270</td>
<td>0.053</td>
<td>0.017</td>
<td>0.079</td>
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<tr>
<td>Building</td>
<td>0.057</td>
<td>0.005</td>
<td>0.003</td>
<td>0.008</td>
<td>0.002</td>
<td>0.015</td>
<td>0.00</td>
<td>0.000</td>
<td>0.015</td>
<td>0.018</td>
<td>0.012</td>
<td>0.028</td>
<td>0.004</td>
<td>0.012</td>
</tr>
<tr>
<td>Trading and repair services</td>
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<td>0.000</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>0.002</td>
<td>0.00</td>
<td>0.000</td>
<td>0.010</td>
<td>0.006</td>
<td>0.006</td>
<td>0.019</td>
<td>0.015</td>
<td>0.008</td>
</tr>
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<td>0.024</td>
<td>0.006</td>
<td>0.051</td>
<td>0.001</td>
<td>0.059</td>
<td>0.00</td>
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<td>0.000</td>
<td>0.019</td>
<td>0.003</td>
<td>0.046</td>
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</tr>
<tr>
<td>Transport and Communications</td>
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<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.01</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.008</td>
<td></td>
<td></td>
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<tr>
<td>Monetary and financial intermediary services</td>
<td>0.005</td>
<td>0.022</td>
<td>0.011</td>
<td>0.024</td>
<td>0.003</td>
<td>0.063</td>
<td>0.00</td>
<td>0.000</td>
<td>0.022</td>
<td>0.027</td>
<td>0.054</td>
<td>0.036</td>
<td>0.005</td>
<td>0.020</td>
</tr>
<tr>
<td>Real Estate &amp; Other Business Services</td>
<td>0.039</td>
<td>0.036</td>
<td>0.035</td>
<td>0.035</td>
<td>0.016</td>
<td>0.022</td>
<td>0.03</td>
<td>0.049</td>
<td>0.028</td>
<td>0.016</td>
<td>0.021</td>
<td>0.190</td>
<td>0.014</td>
<td>0.032</td>
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<tr>
<td>Other Services</td>
<td>0.003</td>
<td>0.001</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.006</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>0.040</td>
<td>0.012</td>
<td>0.031</td>
<td>0.055</td>
<td>0.007</td>
</tr>
<tr>
<td>Agriculture and livestock products</td>
<td>0.01</td>
<td>0.005</td>
<td>0.000</td>
<td>0.022</td>
<td>0.001</td>
<td>0.005</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.009</td>
<td>0.000</td>
<td>0.004</td>
<td>0.010</td>
</tr>
<tr>
<td>Crop and garden products</td>
<td>0.213</td>
<td>0.373</td>
<td>0.107</td>
<td>0.412</td>
<td>0.033</td>
<td>0.652</td>
<td>0.55</td>
<td>0.717</td>
<td>0.272</td>
<td>0.347</td>
<td>0.486</td>
<td>0.410</td>
<td>0.075</td>
<td>0.242</td>
</tr>
</tbody>
</table>

rate of the economy. From this perspective, the matrix is called direct increasing multiplier matrix. In terms of policy, it can be said for an increase of one million Riyals in each of the policy variables, for example, investment, directly economic production 41,000 Riyals increases. The second element of column is zero that represents the gardening and agricultural crops sector didn’t have any purchase from livestock products sectors.

It should be noted here that the coefficient of zero doesn’t mean not buying of gardening and agricultural crops from livestock products but zero is due to gardening and agricultural crops sector had make small amount of purchase from animal products sector. In figures of this column gardening and agricultural crops sector have the greatest buying from industries sectors. The sixth element of the column equal to 0.060, which shows the gardening and agricultural crops sector use 0.060 of one Riyal input or output to purchase goods and mediator services from this sector or other sectors and pay the rest of it as adding value to the production factors, labor and capital and part of it is paid also in the form of taxes.

The second column of the table shows the cost of livestock production. The first element of the second column shows that from one Riyal input of livestock products, 0.151 is spent to buy the products of farm and garden. The second element in this column indicates that from one Riyal of livestock products 0.028 Riyal is spent on animal products. The remaining figures in this column are interpreted similarly. Sum of columns numbers in gardening and agricultural crops sector is 0.213. This figure indicates that the gardening and agricultural crops sector use 0.213 from one riyal input or output to purchase goods and mediator services from this sector or other sectors and pay the rest of it as adding value to the production factors, labor and capital and part of it is paid also in the form of taxes.
a value-added intermediary. The remaining columns in this table are interpreted similarly.

The sum of column figures of direct increasing multiplier matrix shows how much each part spend its input value to buy products from the all-economic sectors. The (Table1) shows the sum of a column figures technical coefficient matrix.

The first and second entries in this column previously has been interpreted. The third element in this table indicates that the of forestry products and stumpage sector spend 0.075 Riyals of one Riyals on goods and services through its own input. Fishery sector spend 0.033 Riyals of one Riyals on goods and mediator services through its own input. Other figures in this table are interpreted similarly. Sectors of the construction of technical coefficients 0.717 are allocated larger share of their output through the purchase of goods and mediator services. From sub-sections of agricultural products, fishing products sector have highest technical coefficients and forestry and stumpage have the lowest technical coefficients. Technical coefficients matrix shows that among agricultural sub-sections sector fishing sector have the highest direct correlation with other sectors. In addition, integrating subgroups Crop, and fisheries, livestock and forestry stumpage into an agriculture sector, seen that agricultural sector with 0/071 technical coefficients have the largest associated, with industry. In the other hand industry sectors respectively with 0.063 and 0.059 technical coefficients have the largest relation with the transport and communication sector. This reciprocal relationship between agriculture and industry in addition to the major role in the development and growth also play role in each other development.

Increasing Output Multiplier

Inverse Matrix of Leontief is one of the most important components of input-output model. This matrix is the base of increasing multiplier in approach of input-output model. Leontief inverse matrix is presented in Appendix 3. This matrix is also known as increasing output multiplier matrix. The components of the matrix show the production multiplier effects arising from changes in each of the macroeconomic variables (household consumption, government consumption, investment and exports). The increasing output multiplier in model of input-output indicate direct and indirect (induced) effects of a change unit in final demand on production sectors and the overall economy. The first number in the first column of this matrix is equal to 1.051. This means that if a single digit (one million Riyals) of final demand of gardening and agricultural crops increase, directly and indirectly production of gardening and agricultural sector increase 1/051(million riyals) also the second element of first column in this matrix states, if one million-riyal final demand of animal products increases, directly and indirectly production of animal crops increases 0/002 million riyals. The third element in this column indicates that if unit (one million USD) increases in final demand of agricultural and horticultural products, directly and indirectly the production of forestry products and stumpage increases 0.001 unit (million USD). Other figures in this column can be interpreted in the same way. The sum of the first column figures shows the increasing output multiplier of gardening and agricultural crops. In other words, this figure shows that if one unit of final demand of gardening and agricultural crops and increase how will increase the production levels of total economy. So, the sum of first column of the increasing output multiplier matrix equals to 1.416 which shows that if final demand of gardening and agricultural crops increase to one million Riyals the total output of the economy directly and indirectly increases to the extent of 1/416 million Riyals. From this amount, one million Riyals is because of its direct effect and 416 thousand Riyals include indirect and inductive effects. The second column of the matrix effects shows the increasing effects of the livestock products. The first digit in the second column of this matrix is equal to 0.174, which implies that if a final demand of livestock products increased one Riyal directly and indirectly production of horticultural crops 0.174 Riyals increases. The second element of the second column of the matrix indicate that

Table1: Total column matrix of technical multiplier.

<table>
<thead>
<tr>
<th></th>
<th>Gardening and agricultural crops</th>
<th>animal products</th>
<th>forestry products stumpage</th>
<th>fishing products</th>
<th>Mine</th>
<th>Industry</th>
<th>Water, electricity, gas</th>
<th>Building</th>
<th>Trade and fixing services</th>
<th>Hotel &amp; restaurant</th>
<th>Transport and Communications</th>
<th>monetary and financial intermediation services</th>
<th>estate and other business services</th>
<th>Other services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.213</td>
<td>0.373</td>
<td>0.107</td>
<td>0.412</td>
<td>0.033</td>
<td>0.652</td>
<td>0.655</td>
<td>0.717</td>
<td>0.272</td>
<td>0.347</td>
<td>0.486</td>
<td>0.410</td>
<td>0.075</td>
<td>0.242</td>
</tr>
</tbody>
</table>
if one million Riyals increase in final demand of livestock products, livestock products, directly and indirectly, 1.031 million Riyals will be increased. The third element in this column indicates that with one million increasing in final demand of livestock products, forestry products sector and generated stumpage directly and indirectly 0/001 Riyals increases. Other figures in this column can be interpreted in the same way. Sum of second column figures shows the increasing output multiplier of the livestock products. In other words, this figure shows that if final demand for livestock products increases the production rate of the economy will increase. On this basis, it can be seen that livestock products increases the production rate of the agricultural sector with 1/814 increasing output multiplier, and forestry and financial intermediary services have been with technical coefficients 0.123, 0.117 and 0.109. Among the increasing output multiplier of the livestock products sector have been with technical coefficients 0.123, 0.117 and 0.109. Among the increasing output multiplier of different economic sectors, construction sectors, industry, water, electricity and gas have been 2.499, 2.286 and 2.225 produced the highest increasing output multipliers respectively in the economy.

In addition, with integrating gardening and agricultural Crop, livestock and fisheries and forestry stumpage subgroups in agricultural sector, increasing in a unit of final demand of agricultural sector directly and indirectly increases agricultural produce as much as 1.083 unit, in the meanwhile the most effectiveness of increasing in a unit of final demand in the agricultural sector on industry sectors is 0.169 unit. In the other hands the greatest impact of a unit increases in final demand of industry sector in other sectors respectively on the transport and communications, trade and all kind of repairing services sector and the agricultural sector have been with technical coefficients 0.123, 0.117 and 0.109. Among the increasing output multiplier of different economic sectors, construction sectors, industry, water, electricity and gas have been 2.499, 2.286 and 2.225 produced the highest increasing output multipliers respectively in the economy.

Among the subsectors of agriculture sector, fishing sector with 1/814 increasing output multiplier, and forestry

| Appendix 3: Incremental production coefficients matrix (Leontief inverse matrix). |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| (I-A)^{-1}              | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    |
| Crop and garden products| 1     | 1.051 | 0.174 | 0.004 | 0.024 | 0.001 | 0.088 | 0.037 | 0.046 | 0.013 | 0.045 | 0.028 | 0.011 | 0.003 | 0.014 |
| Animal products         | 2     | 0.002 | 1.031 | 0.001 | 0.004 | 0.000 | 0.013 | 0.006 | 0.007 | 0.002 | 0.006 | 0.004 | 0.002 | 0.001 | 0.005 |
| Forestry and logging products | 3      | 0.001 | 0.001 | 1.016 | 0.007 | 0.000 | 0.004 | 0.004 | 0.002 | 0.001 | 0.003 | 0.002 | 0.001 | 0.000 | 0.001 |
| Fishery products        | 4     | 0.000 | 0.000 | 0.000 | 1.072 | 0.000 | 0.001 | 0.001 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 |
| mine                    | 5     | 0.011 | 0.013 | 0.007 | 0.024 | 1.002 | 0.092 | 0.073 | 0.054 | 0.019 | 0.030 | 0.035 | 0.013 | 0.009 | 0.011 |
| Industry                | 6     | 0.146 | 0.225 | 0.073 | 0.393 | 0.015 | 1.690 | 0.480 | 0.877 | 0.237 | 0.362 | 0.521 | 0.183 | 0.051 | 0.181 |
| Water, electricity and gas | 7      | 0.072 | 0.024 | 0.007 | 0.022 | 0.004 | 0.040 | 1.125 | 0.027 | 0.025 | 0.033 | 0.030 | 0.045 | 0.006 | 0.021 |
| Building                | 8     | 0.003 | 0.005 | 0.002 | 0.004 | 0.003 | 0.008 | 0.025 | 1.008 | 0.013 | 0.009 | 0.012 | 0.027 | 0.016 | 0.011 |
| Trading and repair services | 9      | 0.022 | 0.046 | 0.014 | 0.089 | 0.003 | 0.117 | 0.092 | 0.164 | 1.047 | 0.067 | 1.116 | 0.044 | 0.009 | 0.066 |
| Hotel Restaurant        | 10    | 0.001 | 0.001 | 0.000 | 0.002 | 0.001 | 0.003 | 0.004 | 0.003 | 0.003 | 1.002 | 0.003 | 0.003 | 0.001 | 0.009 |
| Transport and Communications | 11    | 0.023 | 0.046 | 0.019 | 0.061 | 0.006 | 0.123 | 0.107 | 0.165 | 0.046 | 0.060 | 1.101 | 0.067 | 0.012 | 0.040 |
| Monetary and financial intermediary services | 12 | 0.061 | 0.066 | 0.048 | 0.067 | 0.021 | 0.064 | 0.089 | 0.101 | 0.049 | 0.040 | 0.053 | 1.250 | 0.022 | 0.052 |
| Real Estate & Other Business Services | 13 | 0.014 | 0.012 | 0.005 | 0.015 | 0.003 | 0.025 | 0.091 | 0.030 | 0.049 | 0.023 | 0.048 | 0.078 | 1.010 | 0.030 |
| Other Services          | 14    | 0.009 | 0.011 | 0.002 | 0.030 | 0.001 | 0.015 | 0.091 | 0.014 | 0.014 | 0.011 | 0.021 | 0.017 | 0.006 | 1.014 |
| Total                   | 1.416 | 1.654 | 1.198 | 1.814 | 1.061 | 2.286 | 2.225 | 2.499 | 1.520 | 1.695 | 1.975 | 1.740 | 1.144 | 1.455 |

products and stumpage with 1/198 increasing output multiplier have the highest and the lowest increasing output multiplier respectively. From a policy perspective, the final demand increasing in sectors that have a higher increasing output multiplier, will have a greater impact on output growth in the economy. Hence, if policy makers are calling for greater growth in production, they should focus on the sectors that have a higher increasing output multiplier. Hence among the sub-sections of agriculture, fishing and livestock products sector have a greater increasing output multiplier than any other agricultural sub-sections that in terms of output growth, investment in this sector is preferred than any other agricultural sub-sections.

Increasing Employment Multipliers

Employment issues due to economic and social importance have always been of interest to economic policymakers. Hence, in this thesis we will investigate the potential of employment in agricultural sub-sections. Calculation of employment potential and employment forecasts in different economic sectors in input-output model in addition to the input-output tables requires employment adverse statistics. So for accounting of employment power, true static of employment must be estimated accordance with the employment sectors of the economy. In this study to estimate the relative proportions of employment in the country in 2018 used Statistical Yearbook of Iran 2018. Total employment in 2018 are derived from the Economic Report 2018 and monitoring functions of Third Five-Year. As the Employment statistics isn’t already available divided into 56 sections or detailed in the table, in order to comply the table with the Employment statistics, 2018 input-output table is aggregated in 14 section. After Employment Statistics Extraction of the input-output table, it is provided to enable the employment sectors are examined. To calculate the employment potential economic sectors, the direct multipliers of employment must first be calculated. These multipliers are obtained by dividing the employment figures on input. And then multiplying this matrix with the multiplier’s matrix, employment multipliers matrix is achieved. Employment multipliers matrix is given in Appendix 4. The components of this matrix show the effects of increasing on employment caused by the change in each of the macroeconomic variables. Increasing employment multiplier in input-output model shows the direct and indirect effects (induction) of a unit change in final demand on the employment in sectors and overall economy. The first number in the first column of this matrix is equal to 0.009. This means that if a single digit (one million Riyals) in final demand of agricultural and gardening products sectors are created [5].

Although creation of the 0.009 job seems somewhat illogical, but it should be noted that this increase in employment per million Riyals has been in final demand and it is really little to create jobs. If we interpret this figure per billion, then it seems reasonable figures. Thus, if a final demand of crops and garden one billion increases ,9 new jobs in economic farming and gardening directly and indirectly will be created. The second element of the second column of the matrix indicates that if one million increases in final demand of livestock products, directly and indirectly, 0.110 new jobs are created in the department of animal products. The third element of third column shows that if final demand for forestry products and stumpage increased a unit (one million Riyals), directly and indirectly, is created 0.258 jobs in the forestry products and stumpage. Other varieties of this matrix can be interpreted in the same way. The sum of a column figures in first column shows the increasing employment multiplier of agricultural and gardening crops sectors. In other words, this figure shows that if final demand of agricultural crops and increase one

<table>
<thead>
<tr>
<th></th>
<th>Gardening and agricultural crops</th>
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<tr>
<td>2</td>
<td>animal products</td>
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</tr>
<tr>
<td>3</td>
<td>forestry products stumpage</td>
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</tr>
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<td>4</td>
<td>fishing products</td>
<td>1/814</td>
</tr>
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<td>5</td>
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</tr>
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<td>Industry</td>
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</tr>
<tr>
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<td>Hotel &amp; restaurant</td>
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</tr>
<tr>
<td>11</td>
<td>Transport and Communications</td>
<td>1/975</td>
</tr>
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<td>12</td>
<td>monetary and financial intermediation services</td>
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</tr>
<tr>
<td>13</td>
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</tr>
<tr>
<td>14</td>
<td>Other services</td>
<td>1/455</td>
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</table>
unit (one million Riyals) new jobs are created in the overall economy. Accordingly, the sum of first column of increasing output multipliers matrix equivalent to the 0.011, which represents if the final demand of agricultural and gardening crops increases, directly and indirectly 0.011 new jobs totally will create in whole economy [6, 7].

The sum of a column figures in second column shows the increasing employment multiplier in livestock products sectors. This figure shows that if final demand for livestock products increases one unit, how many new jobs are created in the overall economy. On this basis, it can be seen that the livestock products sector increasing employment multipliers is 0.115, which represents that if final demand of livestock products increased by one million Riyals, directly and indirectly 0.115 new jobs will be created in the overall economy. Other columns of this matrix are interpreted similarly.

Sum of column of increasing employment multipliers matrix that shows the increasing employment multipliers in economic sectors, is given in the (Table3). First and second row of the table above were interpreted. Third row in this table, the stumpage forestry products sector employment multiplier shows 0.259. This figure shows that if final demand for forestry and stumpage sectors product increases one million Riyals, directly and indirectly, 0.259 new jobs are created in the overall economy. Accordingly, the other figures in this table can be interpreted similarly [8, 9].

Among employment multiplier of different sectors, forestry stumpage sectors, livestock sectors, and construction respectively with 0.259, 0.115 and 0.023 multiplier have had higher employment multiplier in the economy. Among the subsectors of agricultural crops, horticultural products and forestry stumpage have respectively the highest and lowest employment multiplier.

In addition, with integrating of subgroups Crop, livestock, fisheries and forestry stumpage in agricultural sector, a unit increase in final demand a directly and indirectly are created 0.031 - new jobs in the agricultural sector that after it the most impact on employment was in the industry sector by a factor of 0.001. With looking at employment multipliers are given that the highest rate of employment multiplier has been allocated the agricultural, construction and other services.

From a policy perspective, the increasing in final demand sectors that have higher employment multiplier, will have a greater impact on job creation in the economy. Hence, if policy makers are calling for a greater increase in employment, they should focus on higher employment multiplier. Hence among the sub-sections of agriculture, they should focus on growth of forestry stumpage products and livestock products that have greater employment multiplier than any other agricultural sub-sections, that from employment increasing view, investment in these two sectors other than agriculture sub-sections resulted in a greater increase in total employment in the economy.
Table 3: Total column matrix of technical coefficient.

<p>| | | |</p>
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<td>animal products</td>
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<tr>
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<td>fishing products</td>
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<td>Building</td>
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<td>Hotel &amp; restaurant</td>
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<td>estate and other business services</td>
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<tr>
<td>14</td>
<td>Other services</td>
<td>0.021</td>
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</table>

References

*Corresponding author: Mojahed Babapour, Email: drmojahedbabapour@gmail.com

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