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

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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. [1].

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:

$$X = \mathbf{Z} + F \quad (1)$$

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 syscctem 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:

$$x_i = \sum_{j=1}^{2} Z_j + f_i$$

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

$$X \quad x_i \quad \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

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

$$Z \quad Z_{ij} \quad \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix}$$

(F) the final demand matrix.

$$F \quad f_i \quad \begin{bmatrix} f_1 \\ f_2 \end{bmatrix}$$

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

$$(3) \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} + \begin{bmatrix} f_1 \\ f_2 \end{bmatrix}$$

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:

$$(4)\ a_j = \frac{Z_j}{x_j} \Rightarrow A = a_j = Z(\hat{x})^{-1}$$

Mark " ^ " is a diagonal matrix.

Equation (4) shows that for every one-unit increase in production of jth, (Xj) 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:

$$(5)\quad A \quad a_j \quad \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

If equation (4) be replaced in equation (3), the new relationship between the level of production is achieved as follows: $X = AX + F$

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

$$X - AX = F$$

$$I - A\,X = F$$

$$(7)\quad X = (I - A)^{-1} F$$

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:

$$(8)\quad \Delta x_i = R_j \Delta f_i$$

In that

$$R_{ij} = (I - A)^{-1}$$

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.

$$(9)\quad \begin{bmatrix} \Delta x_1 \\ \Delta x_2 \end{bmatrix} = \begin{bmatrix} R_{11} & R_{12} \\ R_{21} & R_{22} \end{bmatrix} \begin{bmatrix} \Delta f_1 \\ \Delta f_2 \end{bmatrix}$$

$$(10)\quad x_i^* = (I - A)^{-1} f_i^*$$

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.

$$(11)\quad \ell_j = \frac{L_j}{x_j} \Rightarrow L_j = \hat{L}_i . x_j \Rightarrow L = \hat{\ell} x$$

In the equation (11), Lj number of professions of jth sector, lj direct coefficient of employment of jth sector, Xj the component of GDP of jth sector and mark " " 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.

$$(12)\ L = \hat{l}(I - A)^{-1} F$$

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:

$$(13)\ \Delta L_i = E_j \Delta F_i$$

In that

$$E = \hat{l}(I - A)^{-1}$$

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.

$$(14)\ L_i^* = \hat{l}(I - A)^{-1} f_i^*$$

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 for middlemen purchases. In terms of policy, it can be said injecting of one million Riyals in each of the policy variables of economic sectors such as Household final consumption, government consumption, investment and export how much will increase directly the production

Appendix 1: Input-output table of the Iranian economy.

Product in product in basic rate		Crop and garden products	Animal products	Forestry and logging products	Fishing products	Mine	Industry	Water ,electricity , gas	Building	Trading and repair services	Hotel Restaurant	Transport and Communications	Monetary and financial intermediary services	Real Estate & Other Business Services	Other services	Sum of middlemen consumption	Total expense	Government consumption expenditure	Gross fixed capital formation	Export of services and goods	import	Change in inventories	The total demand
		1	2	3	4	5	6	7	8	9	10	11	12	13	14								
Crop and garden products	1	4704372	3925 297	0	12 834	5654	28462462	476223	32924	89200	260314	105991	26677	46280	664919	38813148	63083554	0	26532	9210402	-13184 805.97	16199634	114148463
Animal products	2	492 35	726 339	0	63 81	560	440 9258	105 790	45 63	271 96	28 986	108 50	0	156 07	771 146	615 59 11	7487 629	0	130 530	842 016	-215 026. 7268	11 5407 76	25 9418 34
Forestry and logging products	3	100	12	303 64	319 77	587 82	1403 632	137 000	73 70	43 433	165 84	573 67	0	23 853	137 77	18 2425 1	395 705	0	0	133 182	-108 4994. 525	671 702	19 398 46
Fishery products	4	7142	0	0	38 7734	300	437 215	357	69 9	19 30	317 73	82 58	0	12 43	76 807	95 345 8	3285 455	0	0	418 887	-104 763.3 619	12 73 852	58 268 89
mine	5	4745	2	4719	5904	432 518	309 16263	217 1227	847 773	101 227 6	898 05	797 762	0	104 56 55	33 3 4	373 319 82	3528 96	0	0	2928 0152 2	-222 2691. 389	-313 49 35	32 5128 774
Industry	6	6792 803	2578 107	655 33	1127 065	137 1025	214 06 1095	11029 221	8656 6846	231 151 41	1971 522	465 283 89	370 76 14	32 461 45	18 3242 13	4204 847 18	221 387 923	0	16 9925 920	62 514 657	-342 26324 0	53 3716 54	58 54216 32
Water, electricity and gas	7	655 4397	120 668	6167	439 45	745 525	892 7778	508 8114	59 715	300 893 7	193 743	21 214 35	196 61 37	740 006	267 3695	32 250 264	202 59127	0	0	699 837	-587 535.6 55	139 50	526 35 642
Building	8	9922	40 352	0	0	701 346	125 3228	843 932	28 32	194 094 9	58 973	10 80 450	13 448 49	28 0038 1	189 322 3	119 704 37	47 985 85	0	166 5136 27	0	0	0	183 2826 50
Trading and repair services	9	660 028	619 317	12 571	298 092	329 321	3459 52 69	210 5254	1683 73 98	499 433 6	37 76 91	1220 433 8	12 117 09	517 562	107 146 43	854 775 29	618 827 60	0	43 5615 24	1006 56 61	0	-1	200 9874 73
Hotel Restaurant	10	3083	161	0	4262	259 801	902 253	778 37	1229 55	39 22 5	95 64	272 392	11 552 3	60 22 3	1914 592	413 287 2	106 872 66	0	0	665 2150	-109 1265 7.37	0	1055 963 1
Transport and Communications	11	589 480	5698 72	210 13	141 296	109 2226	370 685 96	2815 465	164 998 26	45 032 96	28 597 8	930 9478	25 243 48	101 048 3	470 066 3	811 320 20	57 8170 67	0	216 11 031	2726 5150	-154 0531 6.56	0	172 41995 1
Monetary and financial intermediary services	12	450 4750	934 485	67 970	20 6511	511 9123	128 23 746	227 3404	895 7227	57 223 95	170 255	360 7954	13 2295 78	27 0872 2	73 742 06	67 70032 5	23 647 05	0	0	2637 02	-62 3804.0 069	0	697 049 29
Real Estate & Other Business Services	13	340 941	289 45	0	5824	387 450	33 3758 4	343 1750	971 559	794 321 2	122 971	53 78 751	384 8407	134 755 1	4568 830	317 137 75	163 812 560	0	37 641 14	9648 24	-887 7182.0 62	0	191 37809 1
Other Services	14	145 868	142 529	0	129 805	171 591	2868 383	393 3430	48 57 38	182 34 39	490 81	228 99 56	612 201	807 765	2211 251	15 6710 39	513 668 12	16 88 70 994	0	0	-4891 076	0	231 01776 9
Sum of middlemen consumption		2436 6866	968 6086	208 337	240 1630	106 752 23	381 4667 62	3448 9005	131 3974 25	546 15 966	366 7240	837 733 70	285 8704 3	143 714 77	559 052 99	83 5611 730	668 982 043	168 870 9 94	40 553 3276	411 8319 91	-4003 7309 3.7	799 366 33	2170 393 574
Compensation of employees		1342 8889	115 9054	56 8497	116 9118	7896 057	402 517 34	53 07440	33 287 617	135 785 35	185 245 5	190 909 51	19 2449 95	281 3171	118 084 774	277 7332 89							
Other net taxes on production		29798	67 00	523	16 33	160 129	434 240	119 18	435 60	73 148	41 56	791 72	26 948	859 59 62	196 212	966 409 9							
Operating surplus and mixed income, net		764 72667	1466 5268	1112 229	2254 821	2931 30654	152 852 787	431 7261	1064 1161	10 8791 366	46 759 55	44 3479 29	192 591 34	131 3193 84	21 293 295	885 1339 10							
Consumption of fixed capital		192 9950	641 448	503 60	12 957	132 22 528	1922 1366	8089 106	5926 933	231 791 40	46 52 51	300 314 29	226 2179	34 0691 98	360 4259 5	1751 444 39							
Net taxes on products		-207 9705	-216 722	-100	-132 70	441 83	-8805 254	420 911	198 5955	749 317	-10 54 27	-49 028 99	324 630	208 894	-50 44 04	-128 938 93							
Total output in basic prices		114 148 464	2594 1834	193 9846	582 6889	32512 8774	58 5421 635	5263 5642	1832 826 50	200 9874 73	10 559 631	17 419 951	697 0492 9	191 3780 87	231 017 771	21 7039 3574							
Occupation		9263 4446	277 80 06 35	4927 8119	567 1800	1323 4200	315 730 200	1890 6000	217 4190 00	2722 46 400	15 124 800	158 810 400	20 7966 00	302 496 00	40 2697 800	18 9060 00							

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Appendix 2: Technical Coefficients Matrix.

A		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Crop and garden products	1	0.041	0.151	0.000	0.002	0.000	0.049	0.009	0.000	0.000	0.025	0.001	0.000	0.000	0.003
Animal products	2	0.000	0.028	0.000	0.001	0.000	0.008	0.002	0.000	0.000	0.003	0.000	0.000	0.000	0.003
Forestry and logging products	3	0.000	0.000	0.016	0.005	0.000	0.002	0.003	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Fishery products	4	0.000	0.000	0.000	0.067	0.000	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
mine	5	0.000	0.000	0.002	0.001	0.001	0.053	0.041	0.005	0.005	0.009	0.005	0.000	0.005	0.000
Industry	6	0.060	0.099	0.034	0.193	0.004	0.366	0.210	0.472	0.115	0.187	0.270	0.053	0.017	0.079
Water, electricity and gas	7	0.057	0.005	0.003	0.008	0.002	0.015	0.097	0.000	0.015	0.018	0.012	0.028	0.004	0.012
Building	8	0.000	0.002	0.000	0.000	0.002	0.002	0.016	0.000	0.010	0.006	0.006	0.019	0.015	0.008
Trading and repair services	9	0.006	0.024	0.006	0.051	0.001	0.059	0.040	0.092	0.025	0.036	0.071	0.017	0.003	0.046
Hotel Restaurant	10	0.000	0.000	0.000	0.001	0.001	0.002	0.001	0.001	0.002	0.001	0.002	0.002	0.000	0.008
Transport and Communications	11	0.005	0.022	0.011	0.024	0.003	0.063	0.053	0.090	0.022	0.027	0.054	0.036	0.005	0.020
Monetary and financial intermediary services	12	0.039	0.036	0.035	0.035	0.016	0.022	0.043	0.049	0.028	0.016	0.021	0.190	0.014	0.032
Real Estate & Other Business Services	13	0.003	0.001	0.000	0.001	0.001	0.006	0.065	0.005	0.040	0.012	0.031	0.055	0.007	0.020
Other Services	14	0.001	0.005	0.000	0.022	0.001	0.005	0.075	0.003	0.009	0.005	0.013	0.009	0.004	0.010
		0.213	0.373	0.107	0.412	0.033	0.652	0.655	0.717	0.272	0.347	0.486	0.410	0.075	0.242

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 sectors 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 has spent 0.060 from one riyal output to purchase goods from industry. The industrial sector as well as water, electricity and gas sectors by a factor of 0.057 is in second place. Lowest technical coefficient of 0/000 is devoted to forestry products. Other figures in this column are interpreted similarly. Total figures in this column is sum of technical coefficients that represent the total sectors purchases from other sectors as goods and mediator services. 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.

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 figures in this column represent total purchases of this sector from other sectors as goods and mediator services. sum if figures in this column equals 0.373. This figure suggests that from one Riyal input the output of a 0.373 Riyals spent on goods and mediator services, and remaining of it is paid to production factors as

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 0.107 Riyals of one Riyals on goods and services through its own input. Fishery sector spend 0.412 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

Table1: Total column matrix of technical multiplier.

1	Gardening and agricultural crops	0.213
2	animal products	0.373
3	forestry products stumpage	0.107
4	fishing products	0.412
5	Mine	0.033
6	Industry	0.652
7	Water, electricity, gas	0.655
8	Building	0.717
9	Trade and fixing services	0.272
10	Hotel & restaurant	0.347
11	Transport and Communications	0.486
12	monetary and financial intermediation services	0.410
13	estate and other business services	0.075
14	Other services	0.242

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 increase, 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

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	0.000	0.001	0.000	0.004	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	0.116	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

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 increasing output multipliers of livestock products sector is equal to 1.654 which shows if the final demand of livestock products increases one million Riyals, the total output of the economy directly and indirectly increases to the extent of 1/654 million Riyals. Other columns of this matrix are interpreted similarly. The sum of column increasing output multipliers that show the economic sectors production are given in the table below (Table2).

First and second row of the table above were interpreted previously. Third row in this table show the increasing output multiplier of the products of forestry and stumpage about 1.198. This figure shows that if one million riyals' final demand of forestry products and stumpage sector increase, directly and indirectly total output of economic increase 1/198 million riyals. Accordingly, the other figures in this table can be interpreted in the same way.

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

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 increase directly and indirectly 0.009 new jobs in the 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 2: Increasing output Multipliers of economic sectors.

1	Gardening and agricultural crops	1/416
2	animal products	1/654
3	forestry products stumpage	1/198
4	fishing products	1/814
5	Mine	1/061
6	Industry	2/286
7	Water, electricity, gas	2/225
8	Building	2/499
9	Trade and fixing services	1/520
10	Hotel & restaurant	1/695
11	Transport and Communications	1/975
12	monetary and financial intermediation services	1/740
13	estate and other business services	1/144
14	Other services	1/455

Appendix 4: Matrix of increasing employment coefficients.

L*(I-A)^-1		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Crop and garden products	1	0.009	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Animal products	2	0.000	0.110	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.001
Forestry and logging products	3	0.000	0.000	0.258	0.002	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000
Fishery products	4	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
mine	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Industry	6	0.001	0.001	0.000	0.002	0.000	0.009	0.003	0.005	0.001	0.002	0.003	0.001	0.000	0.001
Water, electricity and gas	7	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Building	8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000
Trading and repair services	9	0.000	0.001	0.000	0.001	0.000	0.002	0.001	0.002	0.014	0.001	0.002	0.001	0.000	0.001
Hotel Restaurant	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000
Transport and Communications	11	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.010	0.001	0.000	0.000
Monetary and financial intermediary services	12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Real Estate & Other Business Services	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Other Services	14	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.018
Total		0.011	0.115	0.259	0.018	0.001	0.016	0.013	0.023	0.017	0.020	0.017	0.007	0.003	0.021

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 products sector 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.

1	horticultural crops	0.011
2	animal products	0.115
3	forestry products stumpage	0.259
4	fishing products	0.018
5	Mine	0.001
6	Industry	0.016
7	Water, electricity, gas	0.013
8	Building	0.023
9	Trade and fixing services	0.017
10	Hotel & restaurant	0.020
11	Transport and Communications	0.017
12	monetary and financial intermediation services	0.007
13	estate and other business services	0.003
14	Other services	0.021

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