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Socio-economic Impacts of Investment Development Policy on the Agricultural Sector

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Abstract

Investment in the agricultural sector is important because this sector greatly affects the realms of providing food independence and security, employment, sustainable development, and environmental preservation. So, this study investigated the socio-economic impacts (direct and indirect effects) of the investment development policy on the agricultural sector and its sub-sectors in Iran in 2011 using a social accounting matrix (SAM). The results included three scenarios including a 15% increase in investment in the agricultural sector, a 10% increase in the investment in the farming and gardening sub-sector, a 15% increase in the investment in the farming and gardening sub-sector, and a 10% increase in the investment in the other sub-sectors. They indicated that the total income of the economy was increased when these scenarios were implemented; however, the first scenario had a greater impact on the total income of the economy (13.12%) compared to the other scenarios. Furthermore, it can be said that the sectors of agriculture (2.98%) and industry (0.36%) were most influenced by the first scenario and the sub-sector of farming and gardening and the industrial sector were most influenced by the second and third scenarios. According to the results of this study, it is suggested to take some actions to develop crop insurance and secure investment against potential losses by the available risks in the agricultural sector. Moreover, the government can play an influential role in controlling inflation and preventing price fluctuations so as to assure and motivate investors to increase investment in the agricultural sector.

Keywords:
*Economic growth;
income; investment;
social accounting matrix*

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INTRODUCTION

Capital is of great importance because it can be converted to other factors in the process of production. The issue of capital and investment has always had many problems in Iran due to the high dependence on oil incomes and the instability of oil prices. Investment in different economic sectors such as the agricultural sector has had high fluctuations. Because of structural problems and the lack of facility for most users, the issues related to investment in the agricultural sector have shown themselves to a higher degree. Although this sector has had the highest share in gross domestic product and employment and provides the necessary needs of the growing population, it has a little share in the allocation of investment resources (Nikookar, 2002). Capital and investment are regarded as a key element for growth and development in the agricultural sector so that the lack of capital in this sector impairs the productivity of the production inputs. Low productivity reduces the expected incomes of agricultural projects and the profitability of these activities resulting in uneconomic and high-risk investments (Abdollahi, 2006).

Furthermore, the investigation of the process of production and import in the agricultural sector indicates that in spite of the increased production of the major agricultural products, a large number of agricultural products are imported. An overview of the share of the agricultural sector in total added value and human force employment and its comparison with the investment share of this sector in the total investment of the country shows the need for paying more attention to this sector. Given the importance of the agricultural sector in the economic growth and development, as well as the power and strength of capital in increasing agricultural production and the development of this sector, it is of vital importance to expand investment in this sector (Hojabr Kiani & Alizadeh Janvislu, 2000). On the other hand, agricultural investment has increased agricultural production due to the comparative advantage

of agricultural production and this has led to an increase in the export of agricultural products. This can help in partially settling the problem of the lack of foreign exchange revenues (Aghanasiri, 2012). So, as already noted, investment in the agricultural sector among the various sectors of the economy is very important. Investment in agriculture can increase production and employment in this sector in light of the steadily increasing demand for food and other agricultural products. In addition, forward and backward links between this sector and the other sectors will help increase production and employment in the other sectors. Therefore, increasing investment in the agricultural sector will create more job opportunities in rural areas, thereby preventing villagers from migrating to cities (Marmazy et al., 2014). Briefly, the agricultural sector is important because it greatly affects the realms of providing food independence and security, employment, sustainable development, and environmental preservation. This makes it clear that the government should specifically take it into consideration and efficiently support this sector in order to develop it and provide new investments (Abdollahi, 2006).

Khosravi et al. (2014) examined the role of financial markets and foreign direct investment (FDI) in the growth of the agricultural economy using dynamic panel data from 1984-2011. They concluded that FDI would increase economic growth in the agricultural sector. But, this relationship is weaker in developing countries than in developed countries. Bagheri Dashbulaki et al. (2016) investigated the impact of exports, investment, and employment on economic growth with an emphasis on the agricultural sector. The results showed that the growth of exports, investment share, and employment had significant effects on the economic growth of the country. Moreover, Kohansal and Hatef (2013) investigated the mutual effects of financial development, foreign investment, and economic growth in the agricultural sector of Iran, using the general-

ized method of moments (GMM) and 3SLS. The results indicated that the level of financial development in the agricultural sector has a significantly positive effect on domestic investment and, in turn, affects economic growth. However, the direct effect of the financial development level on the growth of the agricultural sector is not statistically significant. In the agricultural sector of Iran, foreign investment complements domestic investment and as a result of the increased foreign investment, domestic investment also increases. Foreign investment is significantly influenced by domestic investment in the agricultural sector and the production rate of this sector. In another study, [Kohansal et al. \(2009\)](#) addressed the effect of general investment in agriculture infrastructure on the productivity growth of the agricultural sector in 1971-2003 using dual mode and the estimation of the trans-log cost function and the seemingly unrelated system of equations, and maximum entropy. They concluded that, after the technical change, investment in the infrastructure was the most important factor affecting the growth of productivity in the agricultural sector. Furthermore, [Hadi Zonuz and Kamali Dehkordi \(2009\)](#) investigated the effect of FDI on the economic growth of the selected host countries using econometric techniques with a panel data design in 1998-2004. The results showed that FDI enhanced the economic growth of the host countries, the development degree of the host country affected the rate of FDI attraction, and there was a significant difference between the determinants of economic growth in oil-rich countries and other countries. [Sherbaf et al. \(2013\)](#) studied the effect of FDI and the development of the financial market on economic growth in the selected countries in Western Asia in 1995-2011 through the estimation of the economic growth pattern of these countries using the panel data method. The results of their study indicated that if the financial market was developed, FDI would have a significantly positive effect on economic growth. [Ahmadi et al. \(2011\)](#) con-

ducted a study on economic growth and FDI in developing countries and analyzed it based on panel data. They investigated the Granger causality between economic growth and FDI flow for three income groups from 112 developing countries in 1980-2006. The results revealed a significantly positive relationship between economic growth and FDI flow. Additionally, there was strong evidence for the existence of Granger causality between these two variables in all income groups. [Mahdavi et al. \(2011\)](#) investigated the effect of financial market development on the effectiveness of FDI in the economic growth of the host countries in 1990-2005 and used the panel data method and GLS. The results showed that FDI has a significantly positive effect on the economic growth in developed countries in terms of the financial market. However, FDI does not have a significant effect on the economic growth in less-developed countries in terms of the financial market. Encinas-Ferrer and [Villegas-Zermeño \(2015\)](#) investigated the effect of FDI on the gross domestic product in China, Brazil, South Korea, Peru, and Mexico using the Granger causality test. The results indicated that FDI, as a percentage of the total gross fixed capital formation, has a very low effect on economic growth. [Huang et al. \(2010\)](#) investigated the effect of FDI flow on the economic growth in 61 states of Vietnam in 1995-2006 using panel data. The results indicated that FDI had a positive effect on economic growth in Vietnam. [Ekinci \(2011\)](#) also studied the effect of FDI on employment and economic development in Turkey in 1980-2010 using the Granger causality test. The results indicated a bilateral relationship between FDI and economic growth. [Sridharan et al. \(2009\)](#) worked on the relationship between FDI and economic growth in the BRICS states in 1992-2007 using the Industrial Production Index (IPI), the Dickey-Fuller test, Johnson's autocorrelation test, the co-integration test, and the vector error-correction model (VECM). According to VECM, the results showed a bilateral relationship between FDI and GDP for

Brazil, Russia, and South Africa. Moreover, the results indicated that FDI has resulted in economic growth in India and China. [Ainabor et al. \(2014\)](#) examined the impact of capital formation on the economic growth of Nigeria using time series data from 1960 to 2010. The results confirmed the Harrod-Domar model and proved that the rate of the national income growth had a direct relationship with savings rate and capital formation. The more capable the economy is in saving and investing due to a certain amount of GNP, the higher the gross domestic product (GDP) growth will be. [Ugwuegbe and Uruakpa \(2013\)](#) investigated the impact of capital formation on Nigerian economic growth using the OLS technique. The results indicated that capital formation had a significantly positive impact on Nigerian economic growth in the studied period. [Mehrara and Musai \(2013\)](#) also investigated the relationship between capital formation and economic growth in the MENA region in 1970-2010 using panel-data unit-root tests and panel autocorrelation analysis. The results indicated a strong relationship between economic growth and investment in these countries. Moreover, the results of this study showed that investment does not considerably affect GDP in the short and long run. It means that GDP increases the investment growth in the East and North Africa, but not vice versa. Hence, higher economic growth increases investment.

A review of previous studies on the impact of investment on economic growth shows that the results of most of these studies indicate a positive and significant impact on economic growth in both the agricultural sector and the economy as a whole.

Table 1 shows the status of capital formation in the agricultural sector in four development programs. In the first development program, the average share of the agricultural sector from the fixed capital formation was 3.3%. In the second development plan, the agricultural sector's share of capital formation was 3.4%. The high rate of inflation and low oil revenues in 1994 and 1995 have

been a factor in reducing investment in the agricultural sector but in 1996, due to the increased oil revenues, investment in this sector was increased. But again in 1997 and 1998, the government's investment in this sector was decreased due to the decline of oil prices. In 1999, investment in agriculture was increased by the improvement in foreign exchange earnings from oil sales. In the third and fourth development plans, agricultural sector growth was higher than that of the previous program. Therefore, the average share of the agricultural sector from the fixed capital formation was 3.7 and 4.2 percent, respectively. Also, the average share of the agricultural sector in the fixed capital formation in the first three years of the fifth development plan was 3.9 percent.

Therefore, regarding the importance of the effect of the investment on economic growth, this study investigated the socio-economic impacts of the increased investment policy on the agricultural sector based on the social accounting matrix in the form of three scenarios include:

- Scenario 1: a 15% increase in investment in the agricultural sector
- Scenario 2: a 10% increase in investment in the sub-sector of farming and gardening
- Scenario 3: a 15% increase in investment in the sub-sector of farming and gardening and a 10% increase in the investment in other sub-sectors

METHODOLOGY

The social accounting matrix 2011 was used in the present study developed by the Iranian Research Center of Islamic Legislative Assembly. It is square-shaped composed of 79 rows and columns. The matrix includes 71 productive activities, 3 accounts of production factors, 2 groups of urban and rural families, 1 account of the company, 1 account of government, 1 account of the external world, and a capital account. The government account, the account of the external world, and the capital account are exogenous variables, and the other accounts are endogenous variables.

Table 1
The State of Capital Formation in the Agricultural Sector during Four Development Programs

Year	Capital formation in agriculture	Total capital formation	The share of agriculture in total capital formation
1988	6138.2	193728.7	3.2
1989	7322.7	202753.2	3.6
1990	10365.1	309129.5	3.3
1991	8315.8	294528.9	2.8
1992	8707.5	253581.5	3.4
1993	7052.8	223373.1	3.2
1994	6450.9	208495.5	3.1
1995	9045.2	261803.6	3.4
1996	8564.3	281059.4	3.04
1997	7733.5	285439.9	2.7
1998	13578.2	300026	4.5
1999	11921.6	325362.3	3.7
2000	14209.3	405406.5	3.5
2001	15829.3	432467.6	3.7
2002	16387.8	460022.3	3.6
2003	19886.8	496355	4.0
2004	23272.4	519449.9	4.5
2005	21455.8	512184.8	4.2
2006	22762.5	569217.6	3.99
2007	27058.1	631738.2	4.3
2008	26193.9	650329.9	4.03
2009	26732.99	675347.05	3.96
2010	30955.97	699061.99	4.4
2011	18138.6	532702.0	3.4

(Billions IRR-Percent)

Source: [Central Bank and Statistics Center of Iran, 2008](#)

The social accounting matrix is a kind of accounting system in which the flows of incomes and costs between different institutes and parts of the economy are shown in the form of rows and columns in a matrix. In this matrix, each macroeconomic account is reflected by a column that indicates the payments and a row that shows the receipts of that account. In other words, this accounting system is developed in the form of a square matrix with some rows and columns; each of these rows and columns, on the one hand, presents some information about the production and incomes created by different groups and institutes and, on the other hand, shows the statistics related to the costs incurred by

these institutes. Therefore, the receipts of each institute are shown as income in the rows of the matrix and the payments incurred by each institute are also shown as the cost in its columns. In this matrix, all of the receipts and payments and, consequently, the sum of the rows and columns are equal for each account and this equality should also be made for all receipts and payments of each institution. The selection of the number of the rows and columns of this matrix depends on the economic nature and condition of each country and also on the purpose of the matrix; these factors determine the separability degree of the number of the rows and columns of the matrix. As mentioned, each of

the rows and columns of the social accounting matrix indicates different accounts in the economic system and the values related to which show the value of exchanges made between these accounts in a country and in a definite time period. For each definite account and each pair of definite rows and columns, the items entered in the rows show the receipts or incomes of that account; the items in the column corresponding to these rows also show the amount of payments and the costs related to that account. Generally, in every economic system, all incomes should be equal to their respective costs and this equality should also be made for all corresponding rows and columns in the social accounting matrix. Therefore, for example, the number in the i -th row and j -th column of this matrix shows the payment costs of the j -th account which has been received by the i -th account (Central Bank of the Islamic Republic of Iran, 2008). Table 3 briefly shows the social accounting matrix. According to this table, this matrix shows the relationship between productive activities, the distribution of incomes gained by these activities among the factors of production, and the distribution of incomes among social institutes. Moreover, the matrix describes the manner of income consumption by the socio-economic institutes in the economic structure. As such, the social accounting matrix consists of several parts: account of production activities, account of added value, account of families, account of companies, accounts of government, account of capital, and account of the external world; the three recent accounts have been entered in the table by the general title of the other accounts. The productive activities are separated based on the available divisions for the production activities in the input-output table. The added value is another component of the social accounting matrix and includes the labor force, capital, and land (Parmeh et al., 2011). Families are another group of the accounts whose separability level depends on the questions that are expected to be replied by SAM. The

last group of the available accounts in Table 3 is generally titled with the other accounts and includes the account of government, capital, and the external world (Thorbecke, 2000). Furthermore, there is a general division for the available accounts in SAM, based on which the accounts have been divided into two endogenous and exogenous groups. The importance of this division is in converting SAM into an analytic pattern and also the calculation of the multiplier coefficient. The endogenous accounts of SAM are a group of accounts whose income level is determined by the model requirements. However, the incomes of the exogenous accounts are determined in the model outside the considered relationships. The standard mode of the division of endogenous and exogenous accounts is such that the accounts of production, factors of production, families, and companies are endogenous and other accounts that include the accounts of government, capital, and the external world are regarded as exogenous accounts (Parmeh et al., 2011).

The sets of available accounts in Table 2 interact with costs and incomes in an economic system. As such, based on the summarized figure of SAM that contains the socio-economic flows of the country, income and cost flows can be mentioned as follows: indicates the exchanges between productive parts, represents the matrix of transferring the added value from productive activities to factors of production. Block T_{13} represents the transfer of the income of the factors of production to families (owners of the factors of production). Block represents the consumption pattern of the families and shows how the income of families is spent on the production goods and services (Kohansal & Parmeh, 2014).

X_1 , X_2 , and X_3 represent the expenditures and l'_1, l'_2, l'_3 show the income of the set of the external world, government and investors for purchasing goods and services, the use of factors of production, and payments to the institutes, respectively. Furthermore, Y_1 , Y_2 , Y_3 , and Y_x show the total income and Y'_1 , Y'_2 , Y'_3 , Y'_x

Table 2

Different Types of Endogenous and Exogenous Accounts. Social Accounting Matrix, 2011

Inputs	Outputs	Endogenous accounts			Exogenous accounts	Sum of the inputs (demand and total income)
		Production	Factors of production	Institutes (families and companies without government)	Other accounts (government, accumulation, external world)	
Endogenous accounts	Production	T ₁₁	0	T ₁₃	X ₁	Y ₁
	Factors of production	T ₂₁	0	0	X ₂	Y ₂
	Institutes (families and companies without government)	0	T ₃₂	0	X ₃	Y ₃
Exogenous accounts	Other accounts (government, accumulation, external world)	l' ₁	l' ₂	l' ₃	T	Y _x
Sum of the outputs		Y' ₁	Y' ₂	Y' ₃	Y' _x	

Source: (Defourney and Thorbecke, 1984)

show the total expenditures in each of the related accounts. Since each of the accounts will spend as much as its income, the sum of columns is equal to the sum of rows in each account. In other words, the SAM matrix is a square matrix (Salami & Parmeh, 2001).

Moreover, according to Table 3, the total income received from the endogenous accounts (Y_n) includes two parts: (i) the cost of endogenous accounts T_{nn} which is summarized in vector n, and (ii) the cost of exogenous accounts T_{nx} which is summarized by x (Salami & Parmeh, 2001).

$$Y_n = n + X \tag{1}$$

Similarly, for the income received by exogenous accounts, if T_{xn} and T_{xx} are shown by 1 and t, respectively then we have (Salami & Parmeh, 2001):

$$Y_x = l + t \tag{2}$$

If each of the elements of matrix T_{nn} is divided by the sum of the related column, another matrix is obtained which is called the matrix of average propensity to consume. If the new matrix is called A_n, then, matrix T_{nn} can be shown as the Eq. 4 based on A_n (Salami & Parmeh, 2001):

$$A_n = [A_{ij}] = T_{ij} [Y'_j]^{-1} \quad i, j = 1, 2, 3 \tag{3}$$

$$T_{nn} = A_n \cdot Y'_n \tag{4}$$

$$A_n = \begin{bmatrix} A_{11} & 0 & A_{13} \\ A_{21} & 0 & 0 \\ 0 & A_{32} & A_{33} \end{bmatrix} \tag{5}$$

in which Y'_n is a diagonal matrix and Y'_i (i=1, ..., n) are the elements on its main diameter. Similarly, T_{xn} matrix can be shown as Eq.

6 (Salami & Parmeh, 2001):

$$T_{xn} = A_l \cdot Y_n \quad (6)$$

in which A_l is called the matrix of average propensity to leak. According to the definitions of the two matrices of A_n and A_l , 1 and n can be shown as follows (Salami & Parmeh, 2001):

$$n = A_n \cdot Y_n \quad (7)$$

$$l = A_l \cdot Y_n \quad (8)$$

If the above equations are combined, a new equation is obtained as follows (Salami & Parmeh, 2001):

$$Y_n = A_n Y_n + X = (I - A_n)^{-1} X = M_a X \quad (9)$$

$$M_a = (I - A_n)^{-1} \quad (10)$$

Eq. 9 basically shows an SAM pattern in which the income level of endogenous accounts in SAM is mentioned as a function of the level of the exogenous variable X . In this relation, M_a is the accounting multiplier ma-

trix. This matrix is called the accounting multiplier matrix because it shows the only formed structure in the form of SAM as it is and somehow makes a relationship between definite levels of Y_n and X . Therefore, according to this model, any changes in the amount of injections to each exogenous account will change the income of the endogenous accounts (receipts of productive activities, factors of production, and institutes) (Salami & Parmeh, 2001):

$$\Delta Y_n = M_a \cdot \Delta X \quad (11)$$

For example, in this equation, ΔX represents investment change in the agricultural sector, M_a is the accounting multiplier matrix, and ΔY_n is the change in the receipts of the endogenous accounts in that the change in the income of the production activities account reflects the economic effects and the change in income of the factors of production account and the account of social institutions reflect the social effects of the increased investment in agriculture.

Table 3

Presentation of a General Schema of Exogenous and Endogenous Accounts in SAM

Total income	Expenditures				Endogenous	Incomes
	Symbol	Exogenous	Symbol	Endogenous		
Y_n	x	$T_{nx} = A_x Y_x$	n	$T_{nn} = A_n Y_n$	Total expenditures	
Y_x	t	$T_{xx} = A_t Y_x$	1	$T_{xn} = A_l Y_n$		
		Y'_x		Y'_n		

Source: (Defourney and Thorbecke, 1984)

RESULTS

The basis for the increase in investment in the agricultural sector in the following scenarios was the process of the increased capital formation in the agricultural sector in the past years. The base year of the increase was set in 2011.

Scenario 1: a 15% increase in investment in the agricultural sector

Economic impacts

One of the attributes of the general equilibrium models is that the impacts of the shocks are seen not only in the initial part (in which shock happens) but also in the other parts of the economy due to the existence of back-

ward and forward links. As such, this shock has influenced the other parts of the economy so that, according to Table 4, a 15% higher investment in the agricultural sector (20709073.23 million IRR) increased production by 28097181.26 million IRR. After that, the sectors of industry, services, and commerce, hotel management, and restaurant have shown the highest rate of increase by 14280285.48 million IRR, 7325081.87 million IRR, and 5485589.79 million IRR, respectively. Therefore, according to Table 4, the implementation of this policy among the productive activities had the highest impact on the agricultural sector and the lowest impact on the mining sector (133707.76 million IRR of increased receipts). In terms of the percentage of change in the receipts value, the agricultural sector had the first rank by 2.98 percent. However, the sectors of electricity and commerce had the second rank (0.45 percent) and the transportation sector had the third rank (0.41 percent). Moreover, the sector of crude oil and natural gas had the lowest percentage of growth in this regard. The main reason for these differences is the initial amount of capital accumulation.

Social impacts

Social impacts are the evaluation of two kinds of income distribution: the income distribution of the factors of production and the income distribution of the institutes. The results of the impacts and the consequences of a 15% increase in the investment in the agricultural sector on the income distribution of the factors of production showed that, according to Table 4, among the three constituent categories of the account of the factors of production, the received gross mixed income account (17293791.49 million IRR) has increased more than the receipts of other accounts including gross operating surplus account (10170881.81 million IRR) and service compensation (4190671.76 million IRR).

Furthermore, according to Table 4, the total income of the families was increased by

23719832.07 million IRR after the implementation of this policy. The results indicated that the receipts of the tenth income decile of the families were impacted the highest (6577492.54 million IRR) and the receipts of the first decile were impacted the lowest (655928.37 million IRR). Moreover, it can be said that the income gap was increased between the first and tenth deciles of the families by the implementation of this scenario. The receipts of the account of the companies were also increased by 7697708.009 million IRR. Finally, the total receipts of the economy were increased by 123461444.8 million IRR.

Moreover, since the sectors of agriculture, industry, services, and commerce have a considerable share in the total added value and in the domestic gross production in the country and regarding the fact that these sectors have experienced the highest increase in the production due to a 15% increase in investment in the agricultural sector, they will also increase the economic growth.

Scenario 2: a 10% increase in the investment in the sub-sector of farming and gardening

Economic impacts

In this scenario, it was presupposed that investment in the sub-sector of farming and gardening was increased by 10 percent (8659997.28 million IRR). According to Table 5, this shock increased the receipts of the sub-sector of farming and gardening (10185572.54) and the agriculture sector (10862252.81) more than other sectors. After that, the sectors of industry (with a 5426110.4 million IRR increase in the received income), services (with a 3023743.24 million IRR increase in the received income), and commerce, hotel management, and restaurant (with a 2037014.89 million IRR increase in the received income) were influenced the highest, respectively. Therefore, the impacts of this shock can be observed in other sectors in addition to the sub-sector of farming and gardening due to the existence of backward and forward links. Furthermore,

Table 4

The Impacts of the 15% Increase in the Investment in the Agricultural Sector on the Production of Economic Sectors

Sectors	The total impact of production/income (million IRR)	Percentage of change
Agriculture	28097181.26	2.98
Crude oil and natural gas	294903.11	0.03
Other mines	133707.76	0.19
Industries	14280285.48	0.36
Electricity, gas, and water	2219843.74	0.45
Building	342346.42	0.04
Commerce, hotel management, and restaurant	5485589.79	0.45
Transportation	2209620.25	0.41
Services	7325081.87	0.31
Service compensation	4190671.76	0.35
Gross mixed income	17293791.49	1.08
Gross operational surplus	10170881.81	0.3
Families (first decile)	655928.37	0.45
Families (second decile)	1051760.73	0.53
Families (third decile)	1339621.90	0.57
Families (fourth decile)	1578199.53	0.58
Families (fifth decile)	1760519.51	0.59
Families (sixth decile)	2062156.12	0.60
Families (seventh decile)	2451363.16	0.63
Families (eighth decile)	2774415.98	0.62
Families (ninth decile)	3468374.225	0.63
Families (tenth decile)	6577492.54	0.68
Companies	7697708.009	0.3
Total	123461444.8	13.12

it can be said that this scenario had the highest impact on the sector of farming and gardening and the lowest impact on the sector of forestry (with a 34317.1 million IRR increase in the received income).

Social impacts

Factors of production such as service compensation, operational surplus, and mixed income had an increased rate of receipts due to the implementation of this policy so that the mixed income account had the highest increase in receipts (7472176.32 million IRR). Moreover, the received rate of the gross op-

erating surplus account and service compensation account were increased by 4009918.05 million IRR and 1618906.75 million IRR, respectively.

Families were another group that was influenced by this policy so that this shock had the highest impact on the tenth income decile (with a 2779941.655 million IRR increase in the received income) and the lowest impact on the first decile (with a 271521.4 million IRR increase in the received income). Moreover, the implementation of this policy increased the income gap between the first and the tenth deciles. The total income of the fam-

Table 5
Impacts of a 15% Increase in the Investment in the Sub-Sector of Farming and Gardening

Sectors	Total impact of production/income (million IRR)	Percentage of change
Agriculture and gardening	10185572.54	1.84
Animal husbandry, poultry, and breeding silkworms, bees, and gazelles	587646.79	0.17
Forestry	34317.1	0.4
Fishing	54716.38	0.19
Crude oil and natural gas	113445.12	0.01
Other mines	50633.75	0.07
Industries	5426110.4	0.14
Electricity, gas, and water	930158.54	0.19
Building	133567.32	0.02
Commerce, hotel management, and restaurant	2037014.89	0.17
Transportation	826990.19	0.15
Services	3023743.24	0.13
Service compensation	1618906.75	0.13
Gross mixed income	7472176.32	0.47
Gross operational surplus	4009918.05	0.12
Families (first decile)	271521.4	0.19
Families (second decile)	439382.59	0.22
Families (third decile)	561688.94	0.24
Families (fourth decile)	662322.996	0.24
Families (fifth decile)	739352.55	0.25
Families (sixth decile)	866406.699	0.25
Families (seventh decile)	1032073.11	0.26
Families (eighth decile)	1165623.65	0.26
Families (ninth decile)	1459232.08	0.27
Families (tenth decile)	2779941.655	0.29
Companies	3035518.86	0.12
Total	49517981.91	6.78

ilies was increased by 9977545.67 million IRR. Furthermore, the implementation of this policy increased the received income of the accounts of companies as well as the total received income of the economy by 3035518.86 million IRR and 49517981.91 million IRR, respectively.

Scenario 3: a 15% increase in the investment in the sub-sector of farming and gardening and a 10% increase in the investment in other sub-sectors

Economic impacts

In this scenario, the investment was in-

creased in the sub-sector of farming and gardening as well as in the other sub-sectors by 15 percent and 10 percent, respectively. As a result, the rate of investment in the whole agricultural sector was increased by 18136047.47 million IRR. It is clear that the implementation of this policy greatly affected the increase in production in the agricultural sector (24258054 million IRR). Additionally, according to [Table 6](#), the highest amount of the increase in production was seen in the sub-sector of farming and gardening (16969167.27 million IRR) due to the implementation of this scenario. After that, the sec-

tors of industry (with a 12306392.55 million IRR increase in the received income), animal husbandry (with a 7468048.38 million IRR increase in the received income), and services (with a 6458584.22 million IRR increase in the received income) were influenced by this shock more than other sectors.

Social impacts

Due to the implementation of this shock, total receipts of the factors of production were increased by 27825235.4 million IRR. According to Table 6, among the factors of production, the gross mixed income account had the highest impact (with a 15727281.49

million IRR increase in the received income) and the service compensation had the lowest impact (with a 3479628.81 million IRR increase in the received income).

Furthermore, the income of families was also increased as a result of the implementation of this policy so that the tenth and first deciles had the highest (5876977.97 million IRR) and the lowest (576102.66 million IRR) increase in the received income, respectively. Furthermore, the total received income by the families was increased by 21109465 million IRR. The income gap was also increased as a result of the implementation of this scenario.

Table 6

A 15% Increase in the Investment in the Sub-Sector of Farming and Gardening and a 10% Increase in the Investment in Other Sub-Sectors

Sectors	Total impact of production/income (million IRR)	Percentage of change
Agriculture and gardening	16969167.27	3.07
Animal husbandry, poultry, and breeding silkworms, bees, and gazelles	7468048.38	2.11
Forestry	-495207.97	-5.7
Fishing	316046.8	1.11
Crude oil and natural gas	254790.54	0.02
Other mines	115128.51	0.16
Industries	12306392.55	0.31
Electricity, gas, and water	1961489.52	0.39
Building	293547.04	0.04
Commerce, hotel management, and restaurant	4722072.51	0.39
Transportation	1896040.38	0.35
Services	6458584.22	0.27
Service compensation	3479628.81	0.29
Gross mixed income	15727281.49	0.99
Gross operational surplus	8618325.08	0.25
Families (first decile)	576102.66	0.4
Families (second decile)	930668.84	0.47
Families (third decile)	1188950.94	0.51
Families (fourth decile)	1401754.43	0.52
Families (fifth decile)	1564612.46	0.53
Families (sixth decile)	1833425.88	0.53
Families (seventh decile)	2183100.29	0.56
Families (eighth decile)	2466646.9	0.55
Families (ninth decile)	3087225.03	0.56
Families (tenth decile)	5876977.97	0.61
Companies	6523742.96	0.25
Total	107724543.5	9.5

Moreover, the received income of the accounts of companies as well as the total received income of the economy was increased by 6523742.96 million IRR and 107724543.5 million IRR, respectively.

Comparison of the impacts of the policies

The investigation and comparison of the three abovementioned scenarios showed that the amount of production increase in the agricultural sector, the increase in the total receipts of the production account and the account of the factors of production and families, and the increased total receipts of the economy have been higher in the first scenario, compared to the other scenarios. Moreover, the income gap in the first scenario was increased more than the other scenarios.

As noted, investment in the agricultural sector increased the income of other sectors, especially agricultural, industry, services, and commerce. Moreover, the sectors of agriculture, industry, services, and commerce have a considerable share in the total added value and in the domestic gross production in the country, which ultimately leads to economic growth. Therefore, the results of this study are consistent with the results of previous studies.

CONCLUSIONS

The present study investigated the socio-economic impacts of the investment development policy in the agricultural sector and its sub-sectors.

The total received income of the economy is increased by 123461444.8 million IRR, 49517981.91 million IRR, and 107724543.5 million IRR in Scenario 1 (a 15% increase in investment in the agricultural sector), Scenario 2 (a 10% increase in investment in the sub-sector of farming and gardening), and Scenario 3 (a 15% increase in investment in the sub-sector of farming and gardening and a 10% increase in investment in other sub-sectors), respectively. Increased production in the economy has two important consequences: increased employment and reduced

inflation in the society. Moreover, the total received income of the families in the first, second, and third scenarios will increase by 23719832.07 million IRR, 9977545.67 million IRR, and 21109465 million IRR, respectively. The increase in the received income of the families is due to the fact that the production rate is increased by the increased investment; consequently, the demand for the factors of production is increased and because of the increased income of the factors of production, the income of the families that are the owners of these factors is also increased. The income of the families is increased and the consumption expenditures of higher deciles of the families (because of the higher increased income) are increased more than the other deciles. Therefore, they are influenced by the increased investment to a greater extent than the other deciles. Moreover, because the increase in the received income of the higher deciles is more than the other deciles due to the implementation of any of the above policies, the implementation of these policies increases the income gap between the first and tenth deciles.

Thus, as the results show, the effects of the economic and social development policy of investment in the agricultural sector and sub-sectors on Iran's development process have been positive but it is evident that the adoption of these policies is not efficient enough to reduce the income gap between income deciles. It seems that such a phenomenon is inevitable.

As mentioned, the maximum increase in production was related to the agricultural, industrial, services and commerce sectors in the first scenario and the agricultural sub-sectors, industries, services, and commerce sectors in the second and third scenarios. In addition, the aforementioned sectors have a significant share in the GDP of the country. Therefore, increasing the production of these sectors will have a greater impact on the country's economic growth

Since the agricultural and industrial sectors in the first scenario and the sub-sector of

farming and gardening and the industry sector in the second and third scenarios have been influenced the highest, it can be said that there is very strong (strong dependence) mediating links between these two sectors.

Furthermore, the amount of the increased income of the factors of production due to the implementation of the first, second, and third scenarios was 31655345.05 million IRR, 13101001.12 million IRR, and 27825235.4 million IRR, respectively. Among the factors of production, the gross mixed income account and the service compensation account had the highest and the lowest increase in the income rate, respectively.

POLICY IMPLICATIONS

Therefore, it is suggested to take some actions to develop crop insurance and secure investment against potential losses due to the available risks in the agricultural sector. Moreover, the government can play an influential role in controlling inflation and preventing price fluctuations so as to assure and motivate investors to increase investment in the agricultural sector. Also, measures such as the use of improved varieties and modern and appropriate technologies are effective in increasing the productivity of capital and labor in the agricultural sector. In addition, the results of this study showed that investment in the agricultural sector has a direct relationship with employment in this sector. In this case, if capital is used by efficient methods to increase production in this sector, the problem of unemployment will largely be eliminated. It is also necessary that the development policy of investment in the agricultural sector be carried out in areas with comparative advantage of production.

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