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The Granted Effects of Agricultural Bank Credits on Total Factor Productivity in Agriculture Production

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Abstract

The present study examined the effect of agricultural bank credit on the productivity of production factors in the agricultural sector over the period 1971-2012 using the Auto Regression pattern with wide interruptions. Solow residual model has been used to calculate the growth rate of total factor productivity of agricultural sector. The results showed that credit variable in the both long-term and short-term has a positive effect on total production factors productivity in the agricultural sectors of Iran. Therefore, an increase in credits granted to the agricultural sector has caused to enhance the growth of these sectors and increase total productivity of production factors in the agricultural sector. The effect of energy consumption, exports of agricultural sector, research and development expenditures in the agricultural sector are also positive on total productivity of production factor in the short and long term. But, in the long run, impact of liquidity and oil income on total productivity production factor in the agricultural sector is negative. Therefore, planning in this regard is important.

Keywords: Credits, Solow Residual, Agricultural Sector

Introduction

Agriculture has a range to the width world and to the dating back history, has mission very important which is sustainable food supply for human. In today's world that many challenges ranging from lack of water and land and population growth to environmental degradation, and globalization, is facing the agricultural sector, honor of this mission, more than any other time, is depends on effective planning, resource allocation and informed choice among the different available options and paths for growth and development (Arab-Mazar et al., 2005). But, the rate of capital formation in this sector is not significant in comparison with performance and capacity of the sector and also in comparison with other sectors. One of the most important factors that have been serves as a deterrent in the way of the use and adoption of new technologies by small farmers and traditional agricultural transferring to modern of emphasized policy-makers, is lack of capital and the credit (Milani-Hosseyni 1994). Financial resource is one of inputs that has basic role for other inputs and the production of agricultural products, which typically producers in providing it are faced with direct and indirect constraints (Soleimani-Pour and Nikooi, 2004). Public policy in this field is applied in two ways. The first is to create the necessary infrastructures such as dam, roads and so on, construction, and access to training of expert labor work and the other part is in line with direct investment to agricultural sector including the allocation of credit and providing necessary facilities for the creation and expansion of the irrigation system, land leveling, and preparing the machines. Because the seasonal nature of agricultural production always is to make a temporary gap between payments and receipts farmers, farmers in order to pay ongoing expenditures and capital, need the past savings income or external grants (credit), and since farmers savings are small, they cannot invest their savings in the agricultural and do not purchase the advanced and innovative inputs (Akbarian et al., 2004).

Credits conferred on the agricultural sector and rural communities and institutions, at least, in three aspects can be effective on strengthening the production of these communities (Rasul F. 2003).

Agricultural credits caused to decrease the negative effects of seasonality of income of agricultural production and could have been effective role in filling the gap between payments and receipts farmers.

Supply of required liquidity to farmers by the distribution of credits can lead to better use of factors of production and to increase levels of production and productivity.

Requirements financing for investments in small units of exploit, which in our country a major part of the exploitation units is allocated to farmers, has a decisive role in increasing capital stock, because these units are often limited to the financial strength and not ability to do new investment.

Parallel with advances in technology, the need has increased to invest in the agricultural sector and demand for loans and credibility. In response to this need in developing countries, including Iran, the beginning of the green revolution in at early 1950s and accelerating the pace of agricultural development, official credit and financial institutions and their most important, specialized agriculture bank relying on government resources, have efforts to fulfill the credit needs of farmers (Najafi, 2003).

Given the importance of credit in agricultural development and considering the fact that the vast majority of formal credits for the agricultural sector is provided by the agricultural bank, assessment the role of credits granted by agricultural sector in increasing the productivity of production factor, is essential as one of indicator of the development of the agricultural sector. To this end and because productivity growth in the agricultural sector is a function of several factors, in the form of multivariate econometric impact of payments by agricultural banks alongside some other economic parameters is to be estimated. In so doing, it is possible to estimate the net impact on productivity growth in agriculture credit.

This study examined the effects of agricultural bank credit on the productivity of production factors in the agricultural sector over the period 1971-2012 using the auto regression model with wide interruptions.

Literature review

Najafi (1992), by investigating the effects and problems of agricultural credits in Fars province (city Marvdasht), after a brief review of agricultural credits in the Iran, came to the conclusion that the fee rate for agricultural loans are relatively "low and is protected by the government. In this study, the effects of income distribution of credits in relation to variables such as area under cultivation and gross revenue and assets of farmers were investigated and showed the relative having of the larger farmers from credits. About the expenditure of obtaining loan, in addition to the payment of fees, are incurred the time opportunity expenditures, transportation expenditures and other. And, in the case of small loans fee expenditures than the loan implicit expenditures constitute a small proportion and increases this number size with enhanced the loan sized and results suggests short-term loan and therefore is low the share of capital loans.

Ghavami (1992), in his study, investigated the agricultural credit in Iran. He, by using linear econometrics model, has evaluated the credit effects on production level of major crops. He used entered credits as an independent variable in the production function and results of the estimation showed that variable coefficient of the credits after the earth factor is of secondary importance.

Iran-Nejad (1996), in another study has examined the agricultural credits and banking system position in the agricultural of Iran despite the deep gap between demand and supply of credits for short-term and long-term investment in the agricultural sector. In his opinion, compared

to total revenues of agriculture sector and expenditures this sector, could estimate the demand for credits. Accordingly, if the income is greater than the sum of its expenditures, there is an increase in excess savings. But if we are faced with a shortage of savings, in which case there is a need to supply deficit through credits. This distance, in fact, indicates the potential demand for credits. He also indicated that the demand for capital and current credits by supplying this credits, during the Second Development Plan, only is provided 48.7% of the demand for agricultural credits. In addition, at this time, banking system also responds to only 40% of the demand for capital credits and 50 percent of the current credits of the agricultural sector.

Nasrin-Doost (1996), by investigating the relationship of private investment in the agricultural sector concluded that public investment in this sector, uninterrupted and with one interruption will have a negative effect and with two interruption will have a positive effect on private investment in agriculture. This subject is justified according to the government infrastructural investment in this sector. Also, variable coefficient of the banking credits, banking interest rate and ratio of wholesale prices to production expenditure is positive and significant. According to studies conducted within and outside of the country, it can be concluded that the credits are effective on the production of farmers and factors including the amount of land and education and is effective on the received credits, and the banking fee rates come down in the formal sector and causes an imbalance in supply and demand for credits and affects farmers' access to credits.

Ghorbani (1997), in a study entitled evaluating the efficiency of loans to farmers in the city of Firozabad in Fars province conclude that contributions cost of capital opportunity, collateral (security) and notarized recorded is higher from total costs of receiving loans and a high percentage of the total costs of receiving loans is formed the hidden costs. Also, he stated that the performance of granting loan to farmers through official channels is low because of the hidden costs of loans and consequently the real interest rate, and cheap loan payments not given to the smallholder farmers and the subsidies did not belong to them. Finally, he suggests that to reduce hidden costs and increase the efficiency needs to expanding the banking system, facilitating the payment of loans, elimination the relationships and existing discrimination, flexibility, and improving the relationships between the customer and bank.

Akbari and Ranjkesh (2003), in a study entitled the growth of the total production factor productivity in agricultural sector during the period from 1345 to 1996, have been evaluated the growth of total production factor productivity in agricultural production during the period 1966 - 1996. In this study, is used the estimation of Cobb-Douglas production function to calculate the total factor productivity growth. The results show that average growth of total factor productivity in agricultural production is to 4.33 percent.

Najafi (2004) examined the effects and issues of agricultural credits in Fars province (city Marvdasht), followed by an overview of the agricultural credits system of Iran to the conclusion that is low the fee loans rates, and supported by the government.

Amini (2005) in a study titled measurement and analysis of the productivity trends, and arranged sectors of the economy of Iran, productivity of labor, capital and total factor productivity is calculated for different sectors of the economy over the period from 1991 to 2003, using Divisia Approach . The results show that the communications sector has the highest rate of growth of total factor productivity and commercial sector, restaurant and hotel has the lowest rate of growth of total factor productivity among sectors of the economy. In this study, average annual growth rate of total factor productivity in the agricultural sector and the overall economy of the country during the period 1991 - 2003 is -1.78 and 0.04 percent, respectively.

Sayal (1990), using cross-sectional data from farmers of the Punjab province of Pakistan, including socio-economic variables, rate of input consumption, yields and prices in southern Punjab of Pakistan in cropping seasons 1987-88, has been investigated to the mean effect of credits and how the effect of the agricultural credits using a endogenously, self-regulatory regression model. Evidence and documents of this hypothesis confirm that sufficient credits improves the allocated efficiency like the technical efficiency and increased the net income. Also results show that the rate of private return is high and rates of social return, although is very low compared to the rate of private return, but is positive. Finally, he proposes that provide way for easy access to credits could play an important role in agricultural development, and increases the productivity of small farms and decreases the unequal concentration of resources. However, credits for small farms are concerned into influential people and owners. Therefore, a system must be created that allocate credits to the target group.

Hiyri-Avnal et al (1995) have studied the distribution of credits in Indonesia. Experimental results show that credits are effective on welfare of the villagers and farmers living. They showed that distribution of credits causes both the growth and the justice. In other words, credits are tools leading to two targets of real production growth and distribution of income among farmers.

Dyagna (1998) with evaluate the effect of access to credits on the welfare believes that access to formal credits by enabling households to reduction their borrowing from informal sources ultimately effects as beneficial on the household's annual income. Although this effect is very small, and reason for significant difference between annual income, is not food security and nutritional status of the members of credit programs and those that are not be a member of this programs. In addition, reflecting the substitution effect is the fact that reduces the loan from informal sources and informal loans will have reducing role on negative impact that loan is product on net income.

Monge and Lewis (2002) in one study have investigated the effect of credit and financial constraints on the behavior and performance of industrial agencies in Costa Rica. In this study, initially describes the financial structure of agencies and then has been evaluated their access to banking credits. Their findings show that formal sources of credit are a major source for funding of large agencies and unofficial sources are a major source for small agencies, as well as informal credits is considered a outstanding form of credit for newly established agencies.

Eduardo and Early (2005), in their study in the Brazil evaluated the uniformity of the granted interest rate to subsidies and credits given to farmers in this country and the purpose of this study was to compare formal and informal interest rate and the effect of these two interest rate on profits and income of farmers and the country's GDP, which obtained results shows that unification of these two rates increases holdings of Brazilian farmers.

Methodology

In this study, the total factor productivity growth in the agricultural sector was extracted using the Solow residual model and then by using econometric methods, the effect of variables including exports, liquidity and oil revenues was investigated, along with credits in agriculture sector on the growth of total production factor productivity. In this studies, lack of the adequate and appropriate information and statistics are major issues that economists faced with problem. Furthermore, another important issue is using methods that are less concerned about the validity of method and model and thus interpretation of results. About the productivity indexes depending to entering the outputs in the numerator and inputs in the denominator, which method is chosen can be considered classifications such as Index Models, Index Number and Simple Index (Value Added Method). In the index models are placed outputs in numerator and in the denominator is the weighted average of inputs. In index number for outputs and inputs using the functions are made the

values of outputs and inputs and then by dividing outputs index on inputs index is calculated the total productivity of production factors and in the value added method, the value added is placed in the numerator and in the denominator is the total services compensation of employees of capital stock.

Solow Residual Model

Increasing productivity means more production with fixed values of inputs, or obtained the same level of production with less input values, or increase the production at a rate higher than the rate of rising inputs. In other words, the productivity is average production per unit of total inputs. If increases the average production per unit from inputs, it is conception of increasing productivity and its reverse, means the decline of productivity. In other words, productivity is indeed the relative efficiency that have been employed resources of production, i.e. labor, capital, etc. Under such conditions in which the population and the demands and needs of individuals are growing, increased production is an inevitable fact. Production increasing by increasing level quantitative of production factors due to resources is possible up to a certain amount, and production can not be exceeded from those amounts. If technical change embodied in the inputs, increasing use of inputs can lead to transmission the production curve to top and therefore the maximum attainable production is enhanced. In this conditions, improving the productivity of the economy has occurred. If there is a loss in the productivity, then moved down the production function and is represented inefficiencies in the use of inputs. One of the most important effects of improved the productivity is increasing production growth rates. If along with growing use of inputs, as well as increasing productivity, production growth will be higher. Thus, productivity growth can be accelerated to production growth. The Solow model suggests the production function to form Cobb-Douglas in order to calculate total factor productivity growth that the general form is as follows:

$$V = AK^{\beta}L^{\alpha} \tag{1}$$

Where A is a technology parameter. Given the assumption of constant returns than the scale and establishing $\alpha + \beta = 1$, it is a production function of only one parameter. By dividing the parties of Cobb-Douglas function on L and perform a series of mathematical operation, the following equation is obtained which through it can be is calculated Â, that is technology growth or in other words growth of total factor productivity:

$$\widehat{P_L} = \hat{A} + \beta.\hat{K} \tag{2}$$

In the above equation $\widehat{P_L}$ is average labor productivity growth, Â is the growth of total factor productivity, Kˆ is capital growth. Therefore Solow residual model, in fact, is nothing more than the difference between average growth factors from production growth. This is expressed mathematically as follows:

$$v^{\wedge} = \eta_t L^{\wedge} + \eta_K K^{\wedge} + TFP^{\wedge} \tag{3}$$

$$TFP^{\wedge} = v^{\wedge} - \eta_t L^{\wedge} - \eta_K K^{\wedge} \tag{4}$$

In other words, those division of production growth can not be explained by the quantitative growth of labor and capital, is attributable to total factor productivity growth. Where Yˆ,Lˆ,Kˆ,TFPˆ represents rates of production growth, employment, capital and total factor productivity, respectively, the parameters ηt, ηK, also are production elasticity of work and capital respectively. As is clear from the above equations, whatever productivity growth is higher, production growth will be higher. In better words, total production factor productivity growth generated by difference

production growth than employment and investment growth, to gain a share of the production factors initially using Auto Regression with wide intervals and in the form of Cobb-Douglas production function, value added of agricultural sector is regressed on the inputs of the labor and capital stock and extracted partial elasticity of the production factors, labor and capital stock, that are same coefficients and used as the share of production factors. After gaining a share of production they are placed in the Solow residual model and extracted the total production factor productivity growth and after gaining total production factor productivity growth, is checked the impact of credits on this variable.

To calculate total production, factor productivity growth using the Solow model, is needed to the statistical items of value added at constant prices in 1997, the value of capital stock at constant prices in 1997 and number of employees in the agricultural sector that have been prepared from statistics released by the central bank of Iran and statistical center of Iran.

In present study, Solow growth model is as follows:

$$\widehat{TFP} = \widehat{v} - \eta_t - \widehat{L} - \eta_k \widehat{K}$$

To obtain the total productivity of factors of production in agriculture, is used from the growth rate of the value added in the agricultural sector, number employees in agriculture (L), and capital stock in agriculture (K). It should also be noted that the production function used in this study is the Cobb-Douglas production function, which was described at the beginning of the debate.

So, after extraction the total production factor productivity in agriculture of Iran, based on Akin love survey (2005), which examines the macroeconomic factors on total production factor productivity, the pattern specified in the present study is:

$$LTFP = \beta_0 + \beta_1 LOIL + \beta_2 LCR + \beta_3 LM + \beta_4 LEX + \beta_5 ENE + \beta_6 RD + \varepsilon_t$$

Where:

LRD: log of the Research and Development variable (billion rials), LOIL: log of the variable of oil revenue (billion rials), LCR: log of the credits variable in agriculture (billion rials), LM: log of the liquidity variable (billion rials), LEX: log of the variable of the exports value in agriculture (billion rials), LENE: log of the energy consumption in agriculture, which is estimated by a autoregressive model with the distributed interval.

Estimation Results of Production Functions Agricultural Sector

Using the dynamic model (Auto-Regression pattern with wide intervals), were tested the long-term relationship between the variables of the model. For this purpose using the Dolado and Mestre test, were calculated 5.4 for the required statistics. Therefore, by comparing the calculated value and Critical quantity provided to 3.91 by Banerjee, Dolado and Mestre at 95%, the null hypothesis is rejected in model and is confirmed the long-run equilibrium relationship between the variables of the model and in this section merely is provided long-run relationship between the variables.

$$LnVA = -6.089 + 0.3LNE + 0.0114LNK \qquad (5)$$

(-5/1) (3/01) (2/9)

Above relationship is same Cobb-Douglas production function. Partial elasticity for inputs of the labor and capital stocks is obtained 3.0 and 01/0 respectively. Now after extraction of partial elasticity, the production factors of the labor and capital stock that are same proportion of production factors, is placed in the Solow residual model (equation (3)) and extracted total production factor productivity growth. After extraction of total production factor productivity

growth, to assess the impact on total production factor productivity variables initially is introduced a appropriate model for estimating and then is investigated the stability variables and ultimately analysis done.

Results of Static Variables

To estimate the coefficients of the influence, variables on growth of total production factor productivity in the agricultural sector, are used the capital stock variable in agriculture, value added of agriculture, employment in agriculture (where the Solow model has been used for extraction efficiency) and volume liquidity in terms of billions of rials and to the base price of year 1997, the research and development cost in the agricultural sector in terms of billions of dollars, credits in agriculture according billion rials, energy consumption in agriculture, in agriculture's export value and oil revenues . Considering the time series of the mentioned variables, first by using methods Dyky- Fuller and Perron, the stationary variables test has been examined. The results are inserted in tables (1) and (2). Given that the economy of Iran is affected by events such as war and revolution, so there is a possibility of structural failure.

To investigate the structural failure of variables is used from the Phillips Perron test. Perron believed that existence of non-stationary in some macroeconomic variables due to structural failure that occurred in this data and if this is about them, static variables are proven. Perron unit root test results showed that most of the variables haven't a unit root, thus, its fluctuations is stable around in trend of time, so all variables except research and development variable is accumulated from order zero (Noferesti, 1999).

Phillips- Perron test results is given in table (1).

Table 1: Critical values of the limiting distribution of the test statistic t in pattern of structural change in the Width of origin and the slope of trend function

Stationary result	Level of significance				Calculated t	Variable name
	10%	5%	2.5%	1%		
I(0)	-3.66	-3.99	-4.32	-4.65	7.49	LTFP
I(0)	-3.66	-3.99	-4.32	-4.65	6.82	LENE
I(0)	-3.66	-3.99	-4.32	-4.65	6.78	LCR
I(0)	-3.66	-3.99	-4.32	-4.65	6.90	LOIL
I(1)	-3.66	-3.99	-4.32	-4.65	1.73	LRD
I(0)	-3.66	-3.99	-4.32	-4.65	8.09	LEX
I(0)	-3.66	-3.99	-4.32	-4.65	4.92	LM

Source: research findings

By comparing this critical value with test statistic quantify of the variables LTFP, LENE, LCR, LOIL, LRD, LEX, LM, which are 7.49, 6.82, 6.78, 6.90, 1.73, 8.09, 4.92, can be concluded since to variables LTFP, LENE, LCR, LOIL, LEX, LM, value of t-statistic is greater than the critical values of the table. So, at a significance level of 5%, the null hypothesis is rejected, that is, existence of a unit root and these variables based on Phillips-Perron test, the trend is stable but LRD variable of the trend is not sustainable.

If to be done existence the unit root test regardless of structural failure by Dyky- Fuller approach, can be seen all of subtracting variables are stable, i.e. I (1). Thus, since the results of the Dyky- Fuller test gives false results and was evaluated unit root without consideration of structural failure in the period of study, so based on Phillips-Perron test all variables are stationary except the research and development costs variables.

Table 2: Results of the stationary research variables using generalized Dyky- Fuller (ADF) test

result	ADF critical value	ADF static	variable
I(1)	-3.53	-4.18	Oil revenue
I(1)	-3.53	-5.28	Production factor productivity
I(1)	-3.53	-4.73	liquidity volume
I(1)	-3.53	-4.14	exports
I(1)	-3.53	-3.63	energy
I(1)	-3.53	-7.93	Research and development
I(1)	-3.53	-4.11	credits

Source: research findings

As noted according to the Phillips-Perron test all variables except research and development variable are I (0) and the Research and Development variable is I (1). After a review of variables stationary, in this study, to show the effect of variables such as credits, exports, oil revenues, costs of research and development, energy consumption and liquidity on the total production factor productivity of the agricultural sector of Iran was used from Microfit software, and the statistics data and information during period of 1971 – 2011 have been extracted from the central bank of the Islamic republic of Iran, the world bank and the International Monetary Fund, and the used model, was auto-regression with extended intervals.

$$\alpha(L, p) = 1 - \alpha_1 L^1 - \ldots - \alpha_p L^p$$

$$\beta_i(L, q_i) = \beta_{io} + \beta_{i1} L + \beta_{i2} L^2 + \ldots + (\beta_{iqi} L_i^q) \quad (6)$$

Long-term relationship between variables were analyzed using the F test that was ensure from the existence of long-run relationship between variables.

Table 3: The results ARDL model (dependent variable – total production factor productivity of the agricultural sector)

t-statics	Standard deviation	coefficient	Variable
4.50	0.13	0.60	Log of total factor productivity to an Pause
-2.98	0.136	-0.40	Log of total factor productivity with two Pause
2.22	0.001	0.003	Log of exports
1.94	0.012	0.025	exports log with an interval
2.62	0.007	0.18	Energy log
-2.63	0.099	-0.26	Virtual variable (War)
3.55	0.007	0.025	Credits log
-2.46	0.005	-0.013	Liquidity log
4.08	0.038	0.15	Research and Development Log
4.44	0.011	0.05	Oil revenue log
-0.93	0.02	-0.02	Oil revenue log with an interval
-4.8	0.03	-0.14	Oil revenue log with two interval
3.12	0.2	0.68	Width of origin

Source: research findings

So that after estimating the dynamic equation, was obtained in which the form-dependent variable with interval can be seen in table 3. computational F statistic is equal to 2.95. The lower

limit of the critical value of the F statistics to and the upper limit of the critical value is equal to 2.36 and 3.55, respectively. Given that computational value (= 2.95) is higher than the lower limit of the critical value, so null hypothesis, based on the absence of a long term relationship, can be rejected.

After confirming the existence of long term relationship between the variables of the model, estimated long-term relationship and its results is shown in table 4.

Table 4: The long-term estimated results

t-statistics	Standard deviation	Coefficient	Variable
3.5	0.01	0.035	exports Log
3.66	0.06	0.22	Energy log
-5.07	0.063	-0.32	Virtual variable (War)
5.16	0.006	0.031	Credits log
-2	0.008	-0.016	Liquidity log
5.45	0.033	0.18	Research and Development Log
-3.84	0.052	-0.2	Oil revenue log
3.5	0.24	0.84	Width of origin

Source: research findings

As the results show, the effect of long-term credits on total production factor productivity is positive and significant in the agricultural sector. In other words, increasing one percent in credits increases productivity of the production factors to 0.03 percent, and with the increase credits granted to the agriculture, it can enhance the growth of this sector and increase productivity of factors of production in the agricultural sector. Also, the variable effect of energy production on the efficiency of the production factors is positive. Therefore, an increase in energy prices reduced the energy consumption and caused the demand curve for labor and capital carried to the left and thus the productivity of the production factors is reduced. Exports of agricultural production is directly related to the productivity of the production factor, one percentage point increase in agricultural sector exports to the rate of 0.035 percent also increased productivity of producing factors. Increased exports will increase motivation of investors in the agricultural sector and will increase the farmers demand for labor and capital and along with it will increases productivity of the production factors. Research and development, will provide information and implications for the agricultural sector that it would increases the quality and quantity of agricultural products, so as to increase the productivity of production factors.

But, in the long term, the effect of liquidity variable on the total production factor productivity of the agricultural sector is negative, that the negative impact of liquidity on total production factor productivity in agriculture could be due to poor communication between the nation's monetary system and agricultural sector. Also, since that risk investment in agriculture is high because of dependence of agriculture to the weather and biological conditions and other inputs affecting on produced in this sector, therefore it is expected to increase liquidity, which are more attracted to other sectors of the economy to agricultural sector. It is also effective on total production factor productivity in this sector. Oil revenues in the long term, has produced a negative and significant effects on the total production factor productivity. Thus, according to the research results, despite that the revenues obtained from oil exports could play a decisive role in improving the efficiency of production, due to correct understanding of policymakers from the economic structure and adoption of incorrect economic policies, caused the price relative deviation of the factors to the detriment endogenous factors such as human capital and labor. On the other hand, the deviation of relative prices of factors has been in favor of using the physical capital factor in particular imported.

The existence of riche oil revenues has caused the easy access to the financial resources. However, if adoption of the incorrect economic policies is witnessed the sharp fluctuations in exchange rates and the possibility of easy import and usually cheaper, it would reduce the incentive of the economic actors for shifting resources to the productive activities and on the other hand, certainly will be seemed transfer of the abundant resources towards unproductive and necessary activities. The results of the estimation error correction model in the table 5 are observed:

Table 5: Short-term estimation results

t-statics	Standard deviation	coefficient	variable
4.50	0.13	0.60	Difference of log utilization of production factors with an interruption
2.22	0.001	0.003	Difference of exports log
2.62	0.007	0.18	Difference of energy log
-2.63	0.099	-0.26	Dummy variable (War)
3.55	0.007	0.025	Difference of credit log
-2.46	0.005	-0.013	Difference of liquidity log
4.08	0.038	0.15	Difference of research and development log with an interruption
4.44	0.011	0.05	Difference of oil revenues log
4.84	0.03	0.14	Difference of oil revenues log with an interruption
3.12	0.2	0.68	Width of origin
-6.20	0.12	-0.80	ECM

Resource: research findings

As the results in table 5 indicate, the effect of oil revenues variable to an interrupt is positive in the short term but is negative in the long term. It is necessary to note that in the long term because of the impact of oil revenues on imports, this variable will have a negative impact on total production factor productivity in agriculture but in the short term will have a positive impact.

In order to evaluate the results, and to determine the percentage of short-term imbalance of the total production factor productivity variable in agriculture that could be adjusted toward the long term, the error correction model was used. ECM coefficient is expressed which the percentage of short-term imbalances total production factor productivity of the agricultural sector could be adjusted to achieve the long-term equilibrium. Error correction factor in the short term, is obtained -0.80. In other words, per each period is adjusted 80% of the imbalance in the total production factor productivity of the agricultural sector and approaches to the long term trend.

Conclusion

In this study, we tried using annual economic time series data of Iran during the 19971 - 2011 to estimated the Solow residual model and auto-regression model with extensive intervals and the effects of different variables on total production factor productivity has been investigated. The results show that credits variable in both long-term and short-term has a positive effect in the total production factor productivity in the agricultural sector, so that an increase in credits granted to the agricultural sector, enhance the growth of this sector and increase productivity of factors of production in agriculture. The effect of energy consumption, exports of agriculture, research and development costs also on total production factor productivity in agriculture in the short and long term is positive. But in the long run, liquidity and oil revenues variables influence on total production factor productivity in agriculture is negative. Therefore planning in this regard is important. So, in line with results of the study, some suggestions are presented as follows:

1. The results of this study showed that credits has a significant effect on the productivity of the production, therefore, to increase the productivity of factors of production, is recommended the continuity financing of the beneficiaries to reduce its financial constraints on the use of new institutions.
2. Since 66% of the credits allocated to this sector is carried out by the Agricultural Bank, is required to increase the number of bank branches Agriculture and easy to get a loan.
3. Oil revenues in the long run have an adverse effect on the production factor productivity, so that an increase in this variable in the long run, increases the imports of exporting countries and this will cause the reduce employment and investment in the sector of the economy, including agriculture and ultimately followed by reduction in the productivity of production. In short term, this variable with an interval will instead the negative impact on the production factor productivity in the agricultural sector. So the government can through oil revenues to pay infrastructural invested in order to agricultural development, securing of investment and entrepreneurship situation improving in agriculture and rural sectors and to higher employment and ultimately productivity of factors of production could also attract foreign investment.
4. Due to an adverse effect of the liquidity or state credits in long-term, it is necessary to maintain economic stability and prevent of the recession, to increase efficiency of production factors to be considered as a priority objective of monetary policy. Increasing the fee and inflation is difficult to predict the prices and reduce investment, which ultimately affects productivity.
5. It is recommended to adopt appropriate trade policies such as measures and policies of the fair importing and exporting and orderly, to try the exports of high value added agricultural products, imports of intermediate materials for agricultural production, to provide proper context of competition and efficiency of agricultural production, create a new destination markets, foreign exchange policy for export promotion and many other policies, and to increase the open trade policies effectiveness to the productivity of the production.

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