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The Analysis of productivity growth of all production Elements in Iran Economy

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ABSTRACT

Sharing productivity has an important and influential role in the growth of production and increasing competition. By calculating and analyzing the productivity indexes of production factors, it can be investigated the performance of production resourses usages in the operation of different economical parts.It is the productivity development elements in production in the temporal period of 1985-2008 in Iran which is under investigation by means of economical measurement in this study. In this direction, first a translog function is estimated by using the collected data for the investigated temporal period. Then, by using the results of estimating the model, the impact of influential elements on the productivity growth of production elements is investigated, which contains: laid growth, the impact of measure arranging, the effects of inapplicability in the allocation of human resources on the productivity development. The results indicated that laid development is an important element in the economical development and the impact of measure arranging, human resources and technological changes are regarded as positive elements in the productivity elements of production bodies.

Key words Technical progress, Technical efficiency, Ruturns to scale, Human capital

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INTRODUCTION

The topic of economical growth and their causing elements are always argumentative in the economical analysis. Many studies has been done over the field of exploration of the effect of different elements on the economical growth, where in physical resources, human resources and work forces are defined as important elements. Based on the investigation of the experiments for different countires, many economists believe that gradually the role and importance of the physical resources are decreased and the human resources are more attentioned as a key element for economical growth. Therefore the growing importance of human resources causes the quality role and specially the quality of work forces to be more inconcentration. The economists consider the benefit and productivity as important and valuable in development. The emphasis in such cases is to an extent that some economists consider the low productivity as being the main case of the lack of progress. In the conditions the higher productivity and the use of existing facilities are no more a selection and are rather a necessity. The investigation of the factors of economical growth in the developed and developing countries shows that the portion of increased productivity of the production elements is preceding over the portion of increased investment. It can be said that nowadays, productivity is turned to be the wealth of the nations and its continuing promotion is regarded as a survival provision for the governments (Emami meibodi, 2005).

Thus, measuring and precise analysis of the productivity is necessary and is noticed by many researchers in recent years. The term productivity means " the power of production, fertility and being productive". The simplest definition of productivity is " A certain amount of product and a certain amount of one or more production element". This criterion recounts the way of using the resources and production elements in a period of time, and the three dimentional effects of technological changes, measure change and change in the use of laids are contained (Amir Teimori and Khalilian, 2007). In the sense, profit in the more criterion is useful and applicable from different

production resources (Taheri, 2001). The higher productivity means production of more goods with the same amount of resources or producing more products in terms of volume and quality with the same amount of laids (Propenko, 1993). Generally the sharing productivity is not a simple relation, rather is a collection of methods for reaching a high standard of life. In some recent decades many studies has been done about the profitability. Malagas and Vis (1996) investigated the effect of commercial releasing on the Total Factor Productivity (TFP[1]) by using the regression pathern based on minute data (sectional latitudinal) on the level of agency. The results pertinent to the effect of support on productivity growth (TFP) was being so sensitive and meaningful to the means of measuring the productivity. Krishna and Mirta (1998) had investigated the effects of commercial releasing on competiton and productivity by using the panel minute data for the time period of 1993-1986 on a collection of sample agencies in India in 1991. The results indicates that the mentioned policies lead to increasing the competition (decreasing the price-final costs) and increasing the rate of productivity growth. Sanhadjy (1999) considers the productivity of all elements of a country dependent on the variables of the primary quantities which contains: the primary average ratio, the primary productivity ratio levels of elements in each country in contrast with the productivity of all elements in USA. The primary ratio of human resources storage, the primary ratio of the physical resources, the ratio of the human and physical resources storage of each country in contrast with the USA, during the five year period of 1960-1966. The results of estimation shows that all varieties have a forced sign in accordance with the theory. The primary level of the productivity of all elements in contrast with USA have a coefficient lower than 1. Lopez and Sorano (2005) investigated the effects of human resources and external business on the productivity of production elements in 11 different ragions of Spain by using the board data. The outcomes of the estimation during the period of 1980-1996 indicate that human resources and external business had a positive and meaningful impact on the productivity level and growth but their amount of effect on the rate of productivity growth was higher and the resulting effect of each of them on the productivity is reinforced.

Pither Chinloy (1980) in a study called " the investigation of the effect of education on work force quality " analized the impact of education on the growth of work force quality which is increased continually from 1941 to 1967 and reach to 8 percent, but for the 1970-1974 , it was 6.7 percent.

Pilat (1995) compared the productivity of different industries in South Korea with the productivity of similar industries in America and Europe, based on this study, although productivity in some industries in Korea is similar to productivity in Europen industries. The total productivity in Korea in 1987 was within the limits of 26 percent of productivity in America. Some elements like: the intensity of resource application, the saving in industries resulting from the production standard and the educational level of the work forces are of important factors which are influential in productivity differences in South Korea industries and American industries.

Maniko and Romerwol (1992), had expanded the pathern of applicable economical growth in a share article. They first investigated the solo pathern and estimated it for different countries. Then add the human resources to the pathern as one of production elements and estimated it for the same countries. Thud the Kubb- Doglas estimation production function and human resources were meaningful for all times. Zeranejad and Ansari (2007) analyzed the capital productivity in big industries in Khozestan in1971-2004 time period. Based on some outcomes of this study, capital productivity in this province had a constant growth since 1995.

Komijani and Shahabadi (2001) studied the effect of external and internal R and D applications (by external business) on the productivity on all production elements. Based on economical growth theories and international business. They almost considered the stored internal R and D[2] costs business partners capital as sum of imports in expenses levels of R and D stored commercial patherns. The productivity of all elements is also estimated by using the uhanse methodology from the collection temporal series of 1995-1999. The results of the research is showing the positive impact of the capital storage in internal and external R and D and the positive effects of the capital storage of external R and D with the import portion to the internal. Gross production and the ratio of the educated employed people to the total employed people on the total productivity of production elements.

Amir Teimori and Khalilian (2007) calculated the productivity growth of the total production elements in the agricultural part in Iran. The results of this study shows that productivity growth of the total production elements in agricultural parts in the country was changed very much in the period of the investigation and its average was equal to 2.5 percent.

Shahabadi (2002) evaluated the factors affecting the total productivity of elements by using the convergence methodology of uhance and OLS and by using the temporal series collection in the period of 1959-2001. The results

[12]-total factor productivity
[3]-Rural and development

show that storing the research capital and internal development, storing storing the research capital and external development, the human resources the ratio of the exsiting physical resources to the work force, the economical criterion, the exchange relationship, the international resources, the inflation ratio and the rate of forign exchange equality all affect the productivity of all elements. In addition the results of this investigation propose that the effects on the storing research capital and internal development, storing research and external development, human resources and the ratio of the exciting physical capital to the work force have a strongest effect on the productivity of all elements than the other variables.

And meanwhile the coefficient of the estimation of the inflation rate variable and the rate of foreign exchange equality on the productivity of all elements are negative. So in this study we investigate the influential elements on the productivity growth of the production elements and analysis how and ad to what extent each element affect the productivity growth and applicability.

MATERIALS AND METHODS

Here for mesearing the productivity, 2 methods of parametris (economic measurement) and non parametric is used. In the nonparametric method the productivity criterion is determined by using the mathematical programming or calculating index numbers. Meanwhile the method of index numbers incontrast with other method is more direct and statistical. This method is one of the main methods of determining productivity. This is why it is regarded as a selected method of statistical institutions of producing formal statistics of course the quality of the results of this method is dependent on the quality of the primary necessary information (Khvarinejad, 2005).

In economical measurement method the productivity is calculated by the production or dogan function, that is the cost function. Generally the productivity indexs are devided into two categories: partial productivity indexes and total productivity indexes. In the partial productivity indexes, the receiver relation with a laid in under concentration while in the total productivity index of production element, the receiver relation with laids is under investigation. The productivity index of all elements (work force and capital in a linked way) means the ratio of receiver to the laids. The Divisia criterion is used for measuring the productivity of all elements which is not used in this study. In this method by allocating different weights to production elements, the role of each of these production elements is determined in the production process. This criterion permits the incompatible elements life: work force and capital to be considered all together. The parametric (economic measurement) method is used in this study. For analyzing the productivity growth of all production elements. As was mentioned for measuring the productivity the production function or cost estimation is used in this method. The direct estimation of temporal production function is suitable, so that the amount of product is determined internally while for the external amount of production the cost function is preferable (Kant and Nootiyal, 1991). In order to estimate the suitable form function from the existing forms of functions, by considering the advantages of flexible functions, the form of translog function is selected in this study.

Deoposing growth and productivity:

Although classical economic growth models assume technical afficiency and production always ours on the production function frontier, the occurrence of tehnical inneffiiency in a production function can be shown by using a stochastic frontier model (Aigner et al., 1977; Battese and Coelli, 1988, 1992; Greene, 2005),

$$Y = F\left(X_{1t}, X_{2t}, X_{nt}, t\right)e^{-ut} \qquad (1)$$

Where Y is the actual level of output ; F is the potential production function with n inputs; X_{it} is input; and u is a half-normlly distributed random variable with a positive mean. The inclusion of *t* in *f* allows for the production function to shift over time due to technical progress. The last term e^{-ut} measures technical inefficieny. Taking logarithm transformation yields

$$\log Y_t = \log F\left(X_{1t}, X_{2t}, X_{nt}, t\right) - u_t \qquad (2)$$

Technical inefficiency occurs when $u_t \succ 0$ and the level of $\log Y_t$ is les than the level of $\log F$. Differentiating Eq.(2) with respect to time yields the following output growth equation:

$$Y_t^{\cdot} = \sum_i \frac{\partial F}{\partial X_{it}} \frac{X_{it}}{F} X_{it}^{\cdot} + \frac{\partial F / \partial t}{F} - \frac{\partial u_t}{\partial t} \qquad (3)$$

Where $Y_t^{\cdot} = \frac{\partial Y_t / \partial t}{Y_t}$ is the growth of output and $X_t^{\cdot} = \frac{\partial X_{it} / \partial t}{X_{it}}$ is the growh of input X_i. Define $e_{it} = \frac{\partial F}{\partial X_{it}} \frac{X_{it}}{F}$ as the output elasticity for input X_i. Let $e_t = \sum_i e_{it}$ (the sum of the elasticity to each input). It can be shown that e_t is a measure of returns to scale.Suppose changes in all inputs have the same scale, $\Delta X_{it} = aX_{it}$. Consider the changes in output ΔF by taking the total derivative of $F(X_1, X_2, ..., X_n)$ and substituting $\Delta X_{it} = aX_{it}$ into ΔF, we have the following:

$$\Delta F = \sum_i \frac{\partial F}{\partial X_{it}} \Delta X_{it} + \frac{\partial F}{\partial X_{it}} \Delta t = F \sum_i \frac{\partial F}{\partial X_{it}} \frac{aX_{it}}{F} + F\dot{A}_t = aFe_t + F\dot{A}_t \qquad (4)$$

Where $\dot{A}_t = \frac{\partial F / \partial t}{F}$ is technical progress. The production shows increasing(conctant, decteasing) returns to scale when $e_t = 1 (\succ 1, \prec 1)$.

Define the technical efficiency (TE) as the ratio of actual output and the potential output. Then, the growth of the technical efficiency*TE* is

$$TE_t^{\cdot} = -\frac{\partial u_t}{\partial t} \qquad (5)$$

The output growth can be represented as

$$Y_t^{\cdot} = \sum_i e_{it} X_{it}^{\cdot} + A_t^{\cdot} + TE_t^{\cdot} \qquad (6)$$

Consider the following cost minimization problem under perfect competition in the factors markets, but not necessary in the product market.

$$\min_{X_{it}} C_t = \sum_i w_{it} X_{it} \quad \text{s.t.} \quad Y_t = F(X_{1t}, X_{2t}, ..., X_{nt}, t) e^{-u_t} \qquad (7)$$

We express the objective function and the constraint in the Lagrangian form.

$$L(X_{it}, \lambda) = \sum_i w_{it} X_{it} + \lambda (Y_t - Fe^{-u_t}) \qquad (8)$$

Where λ is the Lagrange multiplier. The first-order condition for minimization is the following:

$$w_{it} = \lambda \frac{\partial F}{\partial X_{it}} e^{-u_t}. \qquad (9)$$

Or,

$$w_{it} = \lambda \frac{\partial F}{\partial X_{it}} e^{-u_t} = \lambda \frac{\partial F}{\partial X_{it}} \frac{X_{it}}{F} \frac{F}{X_{it}} e^{-u_t} = \lambda e_{it} \frac{Y_t}{X_{it}} \qquad (10)$$

Multiplying bouth sides by X_{it} ,

$$w_{it}X_{it} = \lambda e_{it}Y_t \quad (11)$$

Taking the sum of all inputs, the total is the following:

$$\sum_i w_{it}X_{it} = \sum_i \lambda e_{it}Y_t \quad (12)$$

or, $$C_t = \lambda e_t Y_t \quad (13)$$

Denote the cost share of input X_{it} as s_{it} Dividing Eq. (11) by Eq. (13), the cost share is the following:

$$S_{it} = \frac{w_{it}X_{it}}{C_t} = \frac{e_{it}}{e_t} \quad (14)$$

This shows that the cost share is always equal to the relative output elasticity in the case of cost minimization. We can rewrite the

$$\dot{Y_t} = e_t \sum_i \frac{e_{it}}{e_t}\dot{X}_{it} + \dot{A}_t + T\dot{E}_t \quad (15)$$

By adding and subtracting term,

$$\dot{Y_t} = \sum_i \frac{e_{it}}{e_t}\dot{X}_{it} + (e_t - 1)\sum_i \frac{e_{it}}{e_t}\dot{X}_{it} + \dot{A}_t + T\dot{E}_t \quad (16)$$

Using Eq.(14),

$$\dot{Y_t} = \sum_i s_{it}\dot{X}_{it} + (e_t - 1)\sum_i s_{it}\dot{X}_{it} + \dot{A}_t + T\dot{E}_t \quad (17)$$

Eq(16) shows the decomposition without cost information *(w)* and can be used for the empirical estimation of the sources of output growth, if the parameters of the production function are known, Eq. (17) shows that output growth can be decomposed into four components: weighted sum of input growth, adjusted scale effect, technical progress, and growth of technical efficiency. For the first term in Eq.(17), the weight for each input growth is equal to the cost share of each input. The second term represents the adjusted scale effect. When the returns to scale are constant, this term is zero. For the production with oncreasing returns to scale, $e_t \succ 1$, a part of returns to scale($e_t - 1$) contributes to the output growth if aggregate input growth is positive. The contribution from returns to scale($e_t - 1$) is weighted by the aggregate input growth $\sum_i s_{it}\dot{X}_{it}$. If the aggregate input growth is zero, then the scale effect is zero. The first two terms in Eq.(17) show that input growth has two impacts on output growth, one is the direct impact through scale effect.

The decomposition in Eqs. (16) and (17) has relaxed a major assumption in Solows(1957) decomposition of economic growth, as indeed, the growth decomposition as shown by Eqs. (16) and (17) can be applied to any types of production function as long as output elasticity for each input can be drived. This implies that a nonlinear production function such as the translog function can be used for growth decomposition(TFP) can be defined as follows:

$$TFP_t = \frac{Y_t}{\Phi_t} \quad (18)$$

Where Φ_t is the aggregate input. Taking logarithm and differentiation with respect to time, the TFP growth is the following:

$$\dot{TFP}_t = \dot{Y}_t - \dot{\Phi}_t \quad (19)$$

Although it is not feasible to measure Φ since it is the aggregate of different inputs with different unit of measurements, a commonly used measure of input growth is the Divisia index(Jorengson and Griliches, 1967).

$$\dot{\Phi}_t = \sum_i \frac{w_{it} X_{it}}{C_t} \dot{X}_{it} = \sum_i s_{it} \dot{X}_{it} \quad (20)$$

Substituting Eqs. (17) and (20) into (19), the TFP growth is as follows:

$$\dot{TFP}_t = (e_t - 1) \sum_t s_{it} \dot{X}_{it} + \dot{A}_t + T\dot{E}_t \quad (21)$$

Then, the TFP growth has three components: adjusted scale effet, technical progress, and growth of technical efficiency (Bauer,1990; Kumbhakar and Lovell,2000,pp.284).

The random eror v_{it} is symmetric and normally distributed with $v_{it} \square N\left(0, \sigma_v^2\right)$ and u_{it} is a non-negative truncated normal random error with the probability distribution of $N\left(\mu, \sigma_\mu^2\right)$, Where μ is the mode of normal distribution. The non-negative property of the random error u_{it} is used to measure technical inefiiency as in Eq.(5).

$$\begin{aligned} \ln Y_{it} &= \alpha + \beta_K \ln K_{it} + \beta_L \ln L_{it} + \beta_H \ln H_{it} + \beta_{KK} (\ln K_{it})^2 \\ &+ \beta_{LL} (\ln L_{it})^2 + \beta_{HH} (\ln H_{it})^2 + \beta_{KL} \ln K_{it} \ln L_{it} + \beta_{KH} \ln K_{it} \ln H_{it} \\ &+ \beta_{LH} \ln L_{it} \ln H_{it} + v_{it} + u_{it} \end{aligned} \quad (22)$$

From Eq.(22), the output elasticity for physical capital, labor, and human apital for province ***i*** and time ***t***, which are denoted as $e_{K_{it}}$,$e_{L_{it}}$ and $e_{H_{it}}$, respectively, can be derived as follows:

$$e_{K_{it}} = \beta_K + 2\beta_{KK} \ln K_{it} + \beta_{KL} \ln L_{it} + \beta_{KH} \ln H_{it} \quad (23)$$

$$e_{L_{it}} = \beta_L + 2\beta_{LL} \ln L_{it} + \beta_{KL} \ln K_{it} + \beta_{LH} \ln H_{it} \quad (24)$$

$$e_{H_{it}} = \beta_H + 2\beta_{HH} \ln H_{it} + \beta_{KH} \ln K_{it} + \beta_{LH} \ln L_{it} \quad (25)$$

The returns to scale is measured as $e_{it} = e_{K_{it}} + e_{L_{it}} + e_{H_{it}}$. The cost shares of inputs are $S_{K_{it}} = \frac{e_{K_{it}}}{e_{it}}$, $S_{L_{it}} = \frac{e_{L_{it}}}{e_{it}}$, $S_{H_{it}} = \frac{e_{H_{it}}}{e_{it}}$. Using Eqs.(17) and(21), the decomposition of output growth and the TFP growth is shown as follows:

$$\dot{Y}_{it} = S_{K_{it}} \dot{K}_{it} + S_{L_{it}} \dot{L}_{it} + S_{H_{it}} \dot{H}_{it} + Scale_{it} + \Delta\delta_{Tt} + T\dot{E}_{it} \quad (26)$$

$$\dot{TFP}_{it} = Scale_{it} + \Delta\delta_{Tt} + T\dot{E}_{it} \quad (27)$$

Where $Scale_{it} = (e_{it} - 1)\left(S_{K_{it}} \dot{K}_{it} + S_{L_{it}} \dot{L}_{it} + S_{H_{it}} \dot{H}_{it}\right)$ is a measure of the adjusted scale effet. From Eqs.(5) and(23), the growth of technical efficiency is as follows:

$$\dot{TE}_{it} = u_i \eta \exp\left(-\eta\left(t - T\right)\right) \quad (28)$$

The maximom likelihood method is generally used to estimate the parameters in a stochastic frontier production.(Battese and Coelli, 1988,1992; Kumbhakar and Lovell, 2000; Kumbhakar,1990).

The data used in this study, time series data are relating to Iran's GDP, human capital, physical capital and labor in the period 1967-2008, which are collected from the Statistical Center of Iran. Physical capital is current value of capital in all economic in fixed prices in 1997 which is consisted of economic value of buildings and facilities, machinery and equipments that is used in the production process or they have using capabilities. The literacy rate in each society is calculated by dividing the number of literate people in a particular age or age group to the population of related age or age group and this statistic is considered as Iran's human capital. The active population consists of people over 10 years that have the ability and tend to work that is consider for labor power.

RESULTS AND DISCUSSION

In order to use the time series data in estimating the model, first we should ensure the residents of the variance, covariance and mean of data over time, otherwise, statistics of F and T are not valid and estimated model does not have the capability of invoking (Gojerati , 1999 and Bydram, 2002). The results of Dicky Fuller test indicate that all interested variables has unit root. The test also shows the equations for the remaining sentences are to be settled. So we can say false regression discussion ruled out and the results of regression estimates can be trusted.

Table 1 shows the results of best estimate test of the best function. Column 1 consists of coefficients related to the Cobb-Douglas function and column 2 is related to the Translog functional form. According to the results of the Schwartz bizin and Akaeek criteria must noted that our function is estimated by maximum likelihood estimation, therefore the Translog functional form is the best form for estimation of related function.

Table 1. Maximum likelihood estimates of the stochastic frontier production (1985-2008)

name	Cob-douglas	translog
lnK	-0.04 (0)	1.48 (163.36)
lnL	19.52 (0)	24.19 (158.15)
lnH	-3.67 (0)	-15.49 (7714.3)
Lnk*lnK	-	-1.50 (22.12)
lnH*lnH	-	18.30 (1467.6)
lnK*lnL	-	4.50 (140.23)
lnK*lnH	-	-0.58 (24.81)
lnL*lnH	-	-16.28 (1482.21)
lnL*lnL DR	- 0.45 (0)	-1.03 (52.80) -0.11 (0)
Log-Likelihood	-523.56	-432.89
AIC	37.9	34.13
SBC	35.89	30.52

Note: Numbers in parentheses indicate standard deviation

Variables tendency, total tendency , the share of variable costs, technical efficiency and productivity growth rate of the production factors is calculated on basis of coefficient calculated from the Translog functional form in table (3) and using the relations presented in investigation method of this paper (Tables 2 and 3).

Table 2 shows cost shares of variable tendency for data in period of 1985-2008.According to data in table 2 mean physical capital cost shares is 3/108 that it's process from the beginning time to starting war increase with a rising rate ,reduce in wartime and then increase with a relatively constant rate. Average tendency of human capital is equal

to 0/ 36.that will be showing a relatively upward trend. Average tendency of labor is equal to 1 /05 that its trend is downward.

The amount of physical capital tendency is at its maximum in 1985. Increasing this amount after imposed war time suggests that increasing the amount of physical capital over time will increase products. Considering the total inputs tendency, the efficiency value to scale ratio vary between- 8/7- and 9 /03 which both amounts show Increasing efficiency to scale ratio in this period. The average cost share for physical capital is -0/08, the average share of human capital is 1/56, and the average cost share of labor is equal to -0/48 that shows high share of manpower in cost. Table 3 shows the growth effect of total inputs and scale adjusting effect.

The average total growth of inputs is equal to -0/68.this amount is its maximum amount in 1975. Average physical capital share in growth of is -0/05 and is in its maximum amount in 1975, human capital share is equal to 0/06 and is in its maximum amount in1975, and average labor share is equal to -0/01 and is in its maximum amount in1975 that it was concluded human capital has the highest share and labor power has the lowest share in cost.

Table 2.Output elasticities and cost shares(1985-2008)

year	Output elasticity				Cost share			Total cast share
	ek	el	eh	e	sk	sl	sh	
1967	5.845183	6.138952	-20.7524	-8.76822	-0.66663	-0.70014	2.36677	1.370814
1968	5.424933	5.948892	-18.7198	-7.34595	-0.73849	-0.80982	2.548312	1.420706
1969	5.038519	5.795069	-16.9394	-6.10578	-0.82521	-0.94911	2.774318	1.483099
1970	4.642065	5.597697	-15.0105	-4.77071	-0.97303	-1.17335	3.146379	1.600114
1971	4.240825	5.453411	-13.1982	-3.50401	-1.21028	-1.55633	3.766612	1.797086
1972	3.905281	5.283461	-11.627	-2.4383	-1.60164	-2.16686	4.768505	2.14723
1973	3.565078	5.120616	-10.0569	-1.37119	-2.59999	-3.73443	7.334414	3.09082
1974	3.218571	4.928245	-8.38792	-0.24111	-13.3491	-20.44	34.78905	13.76153
1975	2.859163	4.801416	-6.83654	0.824044	3.469675	5.826653	-8.29633	-3.17199
1976	2.509764	4.699813	-5.3868	1.822774	1.376892	2.578384	-2.95528	-1.24936
1977	2.041323	4.923382	-4.28458	2.680122	0.761653	1.836999	-1.59865	-0.91075
1978	2.094249	4.458275	-3.40446	3.148061	0.66525	1.416197	-1.08145	-0.97479
1979	2.072635	4.128049	-2.58737	3.613316	0.57361	1.142454	-0.71606	-1.16907
1980	2.061226	3.263534	-0.45931	4.865454	0.423645	0.670756	-0.0944	-6.52901
1981	2.098028	2.799797	0.471024	5.368849	0.390778	0.521489	0.087733	6.553293
1982	2.198693	2.549457	0.619304	5.367454	0.409634	0.474984	0.115381	4.707015
1983	2.215749	2.553311	0.43718	5.206241	0.425595	0.490433	0.083972	6.414811
1984	2.216507	2.528484	0.386504	5.131495	0.431942	0.492738	0.07532	7.10999
1985	2.326756	2.107517	0.924003	5.358276	0.434236	0.39332	0.172444	2.846619
1986	2.5737	1.51471	1.378103	5.466513	0.470812	0.277089	0.252099	1.628315
1987	2.699364	1.015869	2.066793	5.782026	0.466854	0.175694	0.357451	1.024665
1988	2.860322	0.395855	2.927467	6.183644	0.462563	0.064016	0.473421	0.672659
1989	2.940445	-0.08024	3.726229	6.586433	0.44644	-0.01218	0.565743	0.532026
1990	3.062289	-1.16921	5.916673	7.809755	0.392111	-0.14971	0.7576	0.410277
1991	3.026086	-1.60335	7.043342	8.46608	0.357436	-0.18938	0.831948	0.414923
1992	2.97536	-1.94422	8.019468	9.050604	0.328747	-0.21482	0.88607	0.428815
1993	2.973686	-1.96841	8.008445	9.013725	0.329906	-0.21838	0.888472	0.424302
1994	3.006132	-2.13119	8.218002	9.092941	0.330601	-0.23438	0.903778	0.410067
1995	3.04662	-2.36659	8.579223	9.259257	0.329035	-0.25559	0.926556	0.395114
1996	3.054808	-2.30524	8.307682	9.057254	0.337278	-0.25452	0.917241	0.38524
1997	3.11906	-2.40738	8.168828	8.880508	0.351225	-0.27109	0.91986	0.354071
1998	3.173745	-2.70499	8.562755	9.031509	0.351408	-0.29951	0.948098	0.33269
1999	3.228917	-2.69193	8.174028	8.711019	0.37067	-0.30903	0.938355	0.300003
2000	3.271125	-2.85164	8.277818	8.697304	0.376108	-0.32788	0.951768	0.279401
2001	3.297965	-2.62352	7.462655	8.137104	0.4053	-0.32241	0.917114	0.243148
2002	3.269389	-2.60018	7.393208	8.06242	0.40551	-0.32251	0.916996	0.242792
2003	3.215815	-2.48836	7.203397	7.930848	0.405482	-0.31376	0.908276	0.249075
2004	3.14544	-2.44086	7.247971	7.952554	0.395526	-0.30693	0.911402	0.26771
2005	3.111826	-2.32662	6.954036	7.739243	0.402084	-0.30063	0.898542	0.263345
2006	3.184169	-1.77509	5.093835	6.502911	0.489653	-0.27297	0.783316	0.161868
2007	3.027088	-1.60469	5.235412	6.657815	0.454667	-0.24102	0.786356	0.238827
2008	2.712099	-1.5273	6.338693	7.523488	0.360484	-0.203	0.84252	0.398566
mean	3.108333	1.057019	0.368832	4.534185	-0.08527	-0.48068	1.565953	1.198954

Source: research findings

The amount of physical capital tendency is at its maximum in 1967. Increasing this amount after imposed war time suggests that increasing the amount of physical capital over time will increase products. Considering the total inputs

tendency, the efficiency value to scale ratio vary between- 8/7- and 9 /03 which both amounts show Increasing efficiency to scale ratio in this period. The average cost share for physical capital is -0/08, the average share of human capital is 1/56, and the average cost share of labor is equal to -0/48 that shows high share of manpower in cost. Table 3 shows the growth effect of total inputs and scale adjusting effect.

The average total growth of inputs is equal to -0/68.this amount is its maximum amount in 1354. Average physical capital share in growth of is -0/05 and is in its maximum amount in 1975, human capital share is equal to 0/06 and is in its maximum amount in 1975, and average labor share is equal to -0/01 and is in its maximum amount in 1976 that it was concluded human capital has the highest share and labor power has the lowest share in cost.

Table 3.Input growth and scale effects(1967-2008)

year	Input growth effect				Scale effect	
	s_kK	s_lL	s_hH	$\dot{\Phi}$	e-1	(e-1) $\dot{\Phi}$
1967	-0.09462	-0.00538	0.122183	-0.6259	-9.76822	5.223743
1968	-0.10683	-0.01321	0.125096	-0.70578	-8.34595	5.01511
1969	-0.1214	-0.01535	0.145624	-0.79975	-7.10578	4.615134
1970	-0.14535	-0.0191	0.156916	-0.9688	-5.77071	4.363494
1971	-0.18318	-0.0491	0.188618	-1.24994	-4.50401	4.297667
1972	-0.24528	-0.0687	0.239073	-1.74548	-3.4383	4.138861
1973	-0.40206	-0.11801	0.384271	-3.21481	-2.37119	3.989932
1974	-2.13027	-0.64769	1.731939	-34.7369	-1.24111	6.112187
1973	0.543993	0.184912	-0.39343	1.711152	-0.17596	1.407892
1976	0.258084	0.063693	-0.10992	1.115625	0.822774	1.874387
1977	0.012227	0.046426	-0.04792	0.677243	1.680122	1.454759
1978	0.027946	0.036652	-0.03147	0.612845	2.148061	1.601557
1979	0.019234	0.030191	-0.04252	0.506693	2.613316	1.958598
1981	0.010121	0.018173	-0.00301	0.419356	3.865454	1.832102
1982	0.002714	0.014393	0.001216	0.39247	4.368849	1.714094
1983	0.015158	0.013362	0.000792	0.41075	4.367454	1.727714
1984	0.018202	0.014107	0.000857	0.426816	4.206241	1.76339
1985	0.001923	0.014409	0.001763	0.434467	4.131495	1.893526
1986	-0.01701	0.011878	0.003666	0.439494	4.358276	1.963006
1987	-0.00286	0.007222	0.006444	0.48029	4.466513	2.296757
1988	-0.00836	0.004657	0.010555	0.482337	4.782026	2.500262
1989	0.004634	0.001731	0.013578	0.482422	5.183644	2.695016
1990	-0.00424	-0.00033	0.034298	0.49605	5.586433	3.377976
1991	0.019066	-0.00419	0.02812	0.431257	6.809755	3.219802
1992	0.0151	-0.00379	0.02543	0.391956	7.46608	3.155486
1993	0.01018	-0.00438	0.006931	0.337957	8.050604	2.708296
1994	0.006356	-0.00455	0.011464	0.345153	8.013725	2.793302
1995	0.005482	-0.00499	0.014939	0.350478	8.092941	2.89469
1996	0.010395	-0.00569	0.002334	0.332137	8.259257	2.676111
1997	0.01329	-0.01029	0.011466	0.35261	8.057254	2.778748
1998	0.013795	-0.01079	0.022574	0.381729	7.880508	3.065856
1999	0.0143	-0.01153	0.005729	0.35915	8.031509	2.769412
2000	0.014898	-0.01136	0.015696	0.392184	7.711019	3.018759
2001	0.017976	-0.01169	-0.00452	0.369886	7.697304	2.639914
2002	0.022466	-0.00989	0.009774	0.419035	7.137104	2.959401
2003	0.024597	-0.00911	0.006458	0.414586	7.06242	2.873433
2004	0.025097	-0.00816	0.010561	0.420326	6.930848	2.922338
2005	0.025054	-0.01049	0.0063	0.404318	6.952554	2.724795
2006	0.023703	-0.01508	-0.02087	0.372818	6.739243	2.051586
2007	0.028744	-0.00131	0.004589	0.496489	5.502911	2.809041
2008	0.02533	0.007127	0.011853	0.471908	5.657815	3.078489
mean	-0.05442	-0.01476	0.066035	-0.68086	3.534185	2.901381

Source: research findings

Table 4 shows the factors influencing on the growth and production efficiency. As these results show that growth of input have a positive impact, scale factor has negative impact, the inefficiency factor of resource allocation has negative impact, no technology has negative impact on GDP and efficiency has a positive impact on total productivity of production factors.

Table 4. Decomposition of output growth and the TFP growth(1985-2008)

year	(1)	(2)	Scale (3)	δ (4)	(5)	(3)+(4)+(5)
1985	0.114866	-0.6259	-0.07189	-0.11955	0.289608	0.098167
1986	0.119899	-0.70578	-0.08462	-0.11955	0.318607	0.114439
1987	0.093809	-0.79975	-0.07502	-0.11955	0.275543	0.080973
1989	0.127635	-0.9688	-0.12365	-0.11955	0.377823	0.134624
1990	0.154557	-1.24994	-0.19319	-0.11955	0.490164	0.177431
1991	0.071858	-1.74548	-0.12543	-0.11955	0.340663	0.09569
1992	0.118188	-3.21481	-0.37995	-0.11955	0.682988	0.183491
1973	0.047355	-34.7369	-1.64496	-0.11955	2.311072	0.546564
1974	0.161855	1.711152	0.276958	-0.11955	-0.23416	-0.07675
1975	-0.02372	1.115625	-0.02647	-0.11955	-0.01975	-0.16577
1976	-0.07662	0.677243	-0.05189	-0.11955	0.131443	-0.03999
1977	-0.04322	0.612845	-0.02649	-0.11955	0.107545	-0.03849
1978	-0.1641	0.506693	-0.08315	-0.11955	0.065041	-0.13765
1979	-0.04517	0.419356	-0.01894	-0.11955	0.086667	-0.05182
1980	0.118309	0.39247	0.046433	-0.11955	0.187171	0.114058
1981	0.104955	0.41075	0.04311	-0.11955	0.163851	0.087415
1982	-0.0207	0.426816	-0.00883	-0.11955	0.089	-0.03938
1983	0.019801	0.434467	0.008603	-0.11955	0.12702	0.016077
1384	-0.09591	0.439494	-0.04215	-0.11955	0.077499	-0.0842
1985	-0.01	0.48029	-0.0048	-0.11955	0.110737	-0.01361
1986	-0.05639	0.482337	-0.0272	-0.11955	0.087695	-0.05905
1987	0.057385	0.482422	0.027684	-0.11955	0.130769	0.038907
1989	0.132061	0.49605	0.065509	-0.11955	0.156603	0.102566
1990	0.114441	0.431257	0.049353	-0.11955	0.135265	0.065072
1991	0.03916	0.391956	0.015349	-0.11955	0.102235	-0.00196
1992	0.014721	0.337957	0.004975	-0.11955	0.11203	-0.00254
1993	0.004918	0.345153	0.001698	-0.11955	0.104915	-0.01293
1994	0.029042	0.350478	0.010179	-0.11955	0.11783	0.008462
1995	0.059048	0.332137	0.019612	-0.11955	0.145639	0.045705
1996	0.027668	0.35261	0.009756	-0.11955	0.112334	0.002544
1997	0.028287	0.381729	0.010798	-0.11955	0.100275	-0.00847
1998	0.015869	0.35915	0.005699	-0.11955	0.109461	-0.00439
1999	0.048418	0.392184	0.018989	-0.11955	0.11766	0.017103
2000	0.032267	0.369886	0.011935	-0.11955	0.125843	0.018232
2001	0.07881	0.419035	0.033024	-0.11955	0.131322	0.0448
2002	0.075265	0.414586	0.031204	-0.11955	0.130701	0.042359
2003	0.062325	0.420326	0.026197	-0.11955	0.118451	0.025102
2004	0.067069	0.404318	0.027117	-0.11955	0.126463	0.034034
2005	0.064047	0.372818	0.023878	-0.11955	0.155367	0.059699
2006	0.06443	0.496489	0.031989	-0.11955	0.116802	0.029245
2007	0.114866	0.471908	-0.07189	-0.11955	0.179294	0.005033
2008	0.119899	-0.6259	-0.08462	-0.11955	0.289608	0.098167
mean	0.043312	0.68086	0.05471	-	0.209646	0.035385

Source: research findings

It should be noted that the impact of technical progress factor was positive on production in the years after the war, but its average value is negative in this years. Totally growth factor of total inputs has highest effect on productivity growth of production factors in total inputs. The effect of this factor in productivity growth reaches its peak in 1354, which almost coincided with the oil shock. Ignoring the effects of this shock and the effects of war, productivity growth in Iran economic sectors has relatively constant process. Technical performance growth in more years is positive value and fluctuated between 2.31 and -0.23.

The total tendency or cost tendency to output shows change percentage thereby it is increasing 1 percentage in production (Nader Dashti and Kazem Yavari, 1388). This tendency is calculated for all Iran economic sectors are calculated in Table 2. Its average is equivalent to 1/19 which means that 1 percentage increasing in production, the total cost increase 1 / 19 percent. This amount could be due to rising returns to scale in the period 1975-1377. In other word tension of the cost to production during the study period represents that efficiency was ascendant to scale. Relation between cost tension to production ratio and efficiency to scale ratio has been the opposite direction each other. This issue is obvious from amount of efficiency to scale ratio. Efficiency to scale ratio during the study period had been equal to 0/05. According to diagram 1, this trend can represent that efficiency was ascendant to scale.

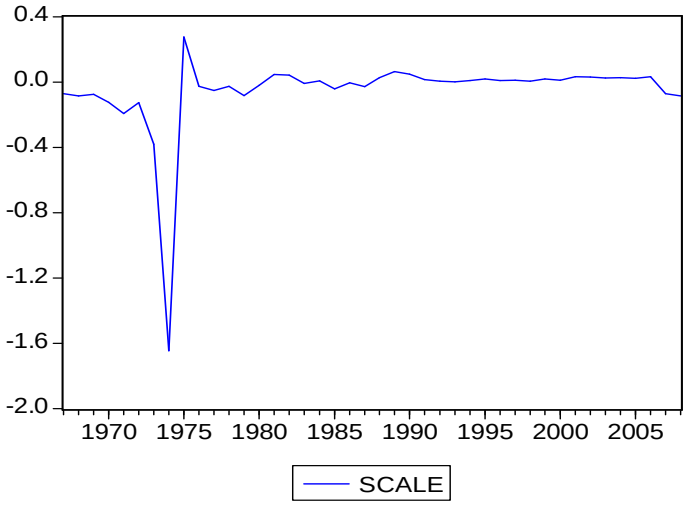
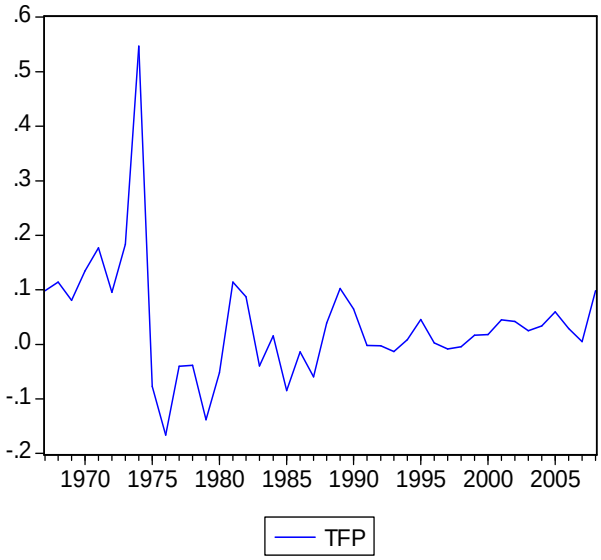


Figure 1: efficiency trend to scale ratio in the period of 1967-1386.

In the first period, the years 1972-1975, during which revenues from the oil sector, increase about several-fold. Political and economic decision makers of the society had the opinion that spending extra money will solve problems. And it will be able to have a dramatic economic transformation; they increase the country's general budget. The average annual growth of public budget represents about 54% in this period which is also higher about 10 percent than the average annual GDP growth. It is natural that the physical facilities, human resources of society cannot attract the increased public budget and therefore after using such numerous financial resources, the society deal with fundamental problems such as manpower shortage, lack of communication infrastructure, shortage of materials, raw materials and intermediate materials, the inperformance of executive management and inflation. (See diagrams 1, 2,3).

Diagram 2: productivity Growth trend of production factors in the period 1967 -2007



During 1976-1978, a period during which the other hand, sudden and dramatic increases in oil revenues is no longer possible and the other hand, the society deal with the problems in the field of human resources, management and physical capacity, the problems are not only entering non-Iranian manpower to country in order to solve the huge shortage of manpower and it also causes the cultural-social problems in the community, but also the dimensions of corruption in administrations become resonant and in this way it has led to cultural attitudes in society. Furthermore, the government practices in years 1972-1975, had been caused relatively peaceful and harmonious movement of society in economic development way community become turbulent in the period 1972-1975 and society wander from normal way of economic movement and be confronted with the economic crisis. During the 1979-1983 period which is after the victory of the Islamic Republic of Iran that total size of the budget was achieved from the result of increasing oil revenues it remains much higher than the actual extent of absorption until 1987. State budget increased more than fourfold within three years 1973, 1974, 1975 and it increased while the economy was not in recession in previous years and there was not exist significant unused capacity in the economy. Naturally, the community actual

capacity of attraction (human resources, management, capital goods, and intermediate goods) cannot be increased over three years from 1975 to 1973 in line with four-fold increasing of public budget. So it concluded that the effect of scale had descent trend in these years and after that from 1977 the trend is ascendant and after that it had almost constant trend (Diagram 1).

Diagram 2 Growth shows productivity growth trend in study period. Average total productivity growth of production factors is 0/035, so that can be said productivity of production factors in study period had ascendant trend. During the oil shocks, productivity is the lowest amount in order to entering the oil revenue into capita in the country. Also according to the chart (4), the total efficiency is the lowest in these years.

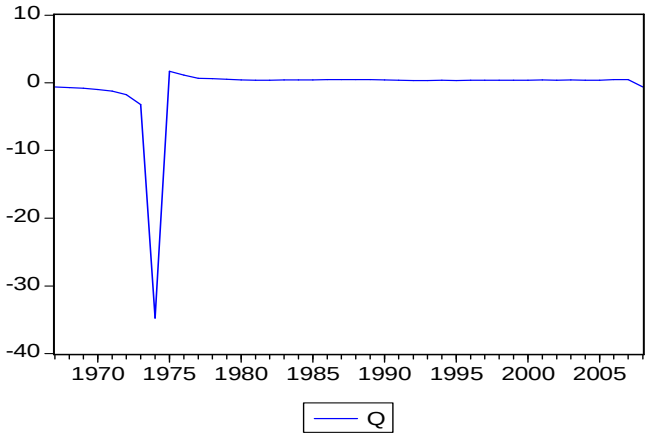


Diagram 3: Total growth trend of inputs in the period 1967 – 2006

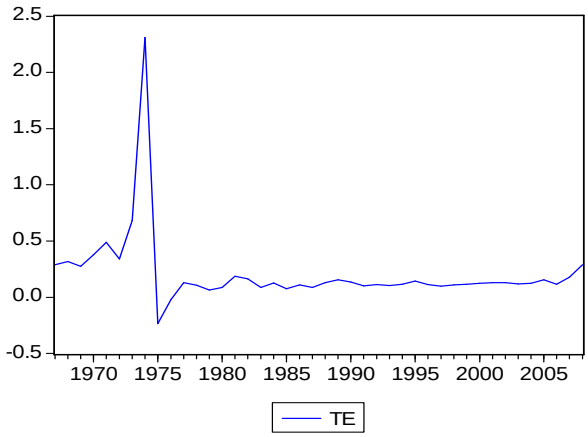


Diagram 4: The technical efficiency in the period 1967-2006

In this study, the contribution of different factors that influenced on productivity growth was investigated in the economy. Dependent variable was Iran GDP in this study which the effect of various factors such as human capital, physical capital, labor and technical progress on it is studied over the period 1967-2006 Basis on this study results, the average human capital had the largest contribution in GDP growth. During this period growth factor f total inputs had a positive impact, the scale factor had negative effect and technical progress factor also have a significant effect on productivity growth of production factors over time.

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