

## The Effect of Actual Currency Rate on Total Productivity of Factors of Production of Industrial Sector of Iran

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### Abstract

The aim of the present research is to study the effect of actual currency rate on total productivity of factors of production in industrial sector of Iran. In other words, the effect of the actual currency rate on total productivity of factors of production in industrial sector of Iran was studied by using econometric method of OLS (ordinary least squares) during 1974- 2006. On this basis, the effects of the actual rate of foreign currency, the openness rate of economy, foreign investment, private and public investment on total productivity of factors of production in the industrial sector of our country were analyzed and studied. In order to calculate total productivity of factors of production Divisia method has been used. The estimation outcome and model estimation indicate that there is a significant and reverse relationship between actual currency rate and economic openness degree with total productivity of factors of production in long-term. The results of this estimation indicate that, due to the dependency of the industry and economy of Iran to imported intermediate and capital goods having modern technologies, which are in turn the results of the R & D activities of developed countries; therefore, with an increase in actual currency rate the investment rate decreases due to capital goods becoming more expensive that this follows with a decrease in total productivity of factors of production. Also, the relationship between the openness rate of economy and total productivity of factors of production indicate that, due to the existence of some weaknesses and problems in Iran's structures and especially in social structures, there is an increase in openness rate of economy resulting in a decrease in total productivity of factors of production of the industrial sector.

**Keywords:** actual currency rate, productivity, factors of production, industry.

### Introduction

Productivity is an Endogenous factor and is influenced by a number of factors such as: management way, communications, the nature and quality of work force, The composition and use of production inputs, industry status, intensity of capital, research and development, technology and the science of transferring technology, production scale, Coefficient of human capital, import and export of goods, change in economic structures, volumes and strategies of the government, access rate to production inputs and raw material, credit funds as well as foreign investment volume.

Human capital and social capital are among effective factors on productivity. Human capital is related to the nature of work force that is specified with the use of extensive amount of training, work experience and hygiene and health level of the work force. The mentioned factors directly and explicitly affect productivity, such that a higher level of training and achieved experience through on-job training increases the level of skills and following that productivity is improved. On one hand, improving the level of hygiene and health of people will increase the output of people's activities and decrease absence of personnel during the year which in turn results in reducing the production expenses and improving productivity.

Social capital includes a group of decisions and operations that instead of wasting the inputs will result in investment and production. Among the most important effects of social capital we can mention its effect on productivity. Social capital through increasing confidence level, reducing Profit-seeking and rentier activities and increasing business relationships between agencies will support investments and provides the contexts for improving creativities which in turn increases total productivity of factors of production that follows with an increase in products manufacturing as well as growth and development in economy.

Lack of correct tax regulations in place and occurrence of business bottlenecks in form of Non-tariff barriers such as import share often is supported by specific groups inside the country, such that they obtain profits because of these bottlenecks. Creation of rent and obtaining profit from such opportunities in addition to reducing the competition in the environment will concentrate agencies on obtaining the available rents and Non-manufacturing and brokerage operations rather than agencies putting effort in their lines of production which in turn reduces productivity. Therefore, social capital is effective in such contexts and with attracting trust and reduction of Profit-seeking and renter activities it provides the context for supporting the investments made and as well as correct application of inputs and production factors and expansion of production rate.

In fact, providing the competitive environment context will cause the agencies inside the country to find enough inclination and interest for improving their management practices, correcting their manufacturing methods, increasing and improving their technologies and expanding their human resources, the achievement of which results in improvement of productivity. One of the various factors which is involved creating productivity growth and development is the openness rate of economy of a country and its interactive relationship with other countries at international business level which leads to familiarity with the latest technologies of the world and through the imports of intermediate and capital goods and also for the purpose of using these types of imported goods or copying them and customization of them, the work force also with on-job training will create productivity.

Strategy for economic openness before considering the society status and whether the relevant organization are ready for accepting the required changes might give use adverse results. In order to take advantage of the mentioned strategy quick changes should be made in the structures, organizations and society. It is because it is only with making such changes that we can solve the possible problems on the way of increasing productivity. Therefore, with encouragements and insistence toward increasing the openness rate of economy as much as possible and without creating the necessary contexts and requirements in the structures, it is possible that a growing crisis occur. In fact, economic openness before making developments in economic, social and political structures of the country and before establishing the relevant regulations in this regard and also before reinforcing communities against the negative effects and outcomes resulting from the Unpredictable changes and fluctuations in markets' developments can prevent the creation of the intended effects toward the growth, development and improvement of public welfare level (Mehrra & Rezaee, 2010).

Basically, economic openness and International Business Interactions results in an increase in competition. With an increase in competition, the agencies inside the country will start to increase their optimized application and use of inputs at their disposal and in this way increase productivity. On the other hand, development of commercial transactions at international level results in increasing the transfer rate of technology and as a result increasing the productivity of agencies inside the country which follows with a development in the economy.

Import of industrial products will transfer various sciences, technologies and research and development from developed countries to developing countries through commercial transactions and

the countries who import these types of products will have the chance to access imported technologies. Therefore, developing countries can often consider the import of products as the basis of the import of industrial products that have the technology of the advanced countries and with making investment on work force and training the work force having the skill and expertise can make possible the learning of the imported science or technology and in this way can increase their productivity and following that increase their economic growth and development. Also, the import of consumer goods in developing countries can be done in order to create competition with the local products and goods in terms of quality and encouraging the export of these products. In fact, commercial strategies should be in forms of importing capital and intermediate products as well as with the use of skilled and trained work force in order to matching the imported technologies with the existing production and technology condition inside the country which can create the context for increasing total productivity of the factors of production and achieving growth and development in economy (Emadzad et al., 2007).

Increasing productivity in every society is separate from research and development in that society and depends on the effects of the research and development of the countries in trade with the given country which is transferred to it through commercial transactions. Therefore, developing societies, including Iran, with an increase in global commercial participations, have managed to obtained modern technologies belonging to developed countries and have managed to reduce the technology gap between their countries and the developed countries (Behboudi & Mamipour, 2007).

Technology increases through internal and external resources. In fact, internal resources in a country for increasing and improving technology are the same as the spent expenses on research and development activates which are invested in research and development agencies for research projects and in this way the technology level will be increased. External resources are the transferring effects and the effects resulting from the expenses made on research and development field by industrial societies toward developing countries. Industrial societies due to having high levels of technology through commercial interactions and import of Intermediate and capital goods as well as direct investment in developing countries will transfer these high levels of technology to developing countries and in fact, direct foreign investments not only provides the financial resources but also has the ability to be the origin of innovative technologies, expertise and skills and Practices in the field of management and support and marketing section and is similar to a channel which Spreads technologies among developing countries. Direct foreign investments have the ability to reduce the gap between savings and investments inside the country and through importing innovative technologies and modern management practices can have a useful effect on increasing the capabilities and competitiveness as well as productivity (Amini et al., 2010).

Relation between government expenses and productivity is one of the debates that have been raised in economic literature. Among the issues and challenges that developing societies are facing lack of access to proper and continuous growth and development and productivity can be mentioned. This challenge in addition to having other challenges and problems in its trail creates some challenges and problems in political, cultural and social areas. Application of different tricks such as government expenses, in spite of creating inflation effects resulting from the increased government spending has been proved both theoretically and practically; however, it is among the discussions about the creation and realization of access to development and productivity. In terms of microeconomics, state interactions influence people's daily life and their life within the context of the society and all Regulations and rules, instructions and circulars which are ruling a society specify the performance of the people living in that society. Against such an opinion and from the perspective of Macroeconomics the state's strategies in economy are with regards to subjects such as allocation of inputs and resources, stability and sustainability of economic situation and

distribution of national wealth and incomes. Most of the developing societies due to lacking proper financial and credit resource have caused monetary strategies to create less effects comparing to financial strategies in their economy in their societies. Application of economic stability strategy by the state is a positive step toward reducing the gap between potential and actual production as well as maintaining the actual production level near to the potential production level. Then, for reducing the gap in the existing economic growth and productivity between the advanced and developing society's countries are required to make planning. Although currently it is seen that some of the economic experts are agree with the presence of the states in developing societies and are not agree with reducing the presence of the governments, but believe that the governments in these societies more than ever and in a more optimized way should perform their duties. Contrary to the above opinion, another group of the economic experts believe that government does not perform their duties and role in an appropriate way. They have criticized governments for their high focus on cities. Also, they believe that work force in public organizations don't have the necessary and required efficiency and in most of them the proper interest and enthusiasm is lacking and often their productivity is lower than the necessary level. In fact, the way governments perform their activities in developing countries and societies have been criticized due to being different from other societies (Majdzadeh Tabatabaei and Nematollahi, 2010). Studies conducted for evaluating the investments in private sector in developing societies show that in these societies, during the time span of 1971 to 1979 the growth rate and increase in domestic gross production has been 3% that during the time period of 1981 to 1989 this has reduced to less than 1%.

In the literature related to economy and from past till present, the level of investment and increase in it have received attention as one of the prominent features in estimating the strategies in the field of economy as well as one of the important factors in economic development and growth.

Research considers the reduction of investment rate and specially the investment rate by private sector among the main reasons for such degradation. Since capital is limited; hence, most of the societies know that on one hand this shortage will be more focused on developing societies. Among the important sectors in economy, the industrial sectors have a pressing need to capital and for industry growth the investment rate should be increased with an increasing intensity. The best allocation of capital and investment requires accuracy and awareness in the way of making investments as well as the identification of the effective factors on investment both long-term and short-term. For this purpose, investment by private sector has a special place as the most efficient way of accessing manufacturing and products (Keshavarzian Peivasti, 2002).

The basis of changes and development of developing countries is the development of industrial sectors and achievement of a higher level and rate of international commercial arena. The economic situation of our country, like the economies of the other developing societies, requires appropriate decisions, policies and strategies for achieving economic growth and development. among the most important criteria related to the economic growth and development level, domestic gross production increase or total value added as well as total productivity of production factors can be named which are the main driving and creating factors of such an increase and improvement of human and physical investments in industrial sector. Considering the fact that industrial sector plays an important role in reducing unemployment, improving the level of national incomes, improving the social welfare level and increasing value added and following them productivity; therefore, evaluation of the effective factors on industrial sector and its productivity such as currency rate becomes necessary more than ever (Kazeroni and Naghavi Koljahi, 2004).

Based on the explained theory, transfer of interest resulting from productivity between societies and between tradable and untradeable goods in each of these societies puts a great emphasis on studying the effect of actual currency rate on increasing and improving productivity.

The creation basis of such as theory is based on the observation of societies that with considering productivity improvement in tradable goods sector comparing to non-tradable goods have achieved an increased level of prices in products (Holub & Cihac, 2003).

The actual currency rate is one of the most important effective variables that exert its effect by goods' import and export on productivity. Then, in developing societies and including Iran that often their required Capital and intermediate goods are procured from imports, the issue of currency and the changes in currency rate is so much important.

Agencies that export goods are a competitor for the imported goods, and make an effort for improving the export rate of the manufactured products of the agency. In addition to this, the products of the above agencies have competitiveness with the similar imported products. At the time when the currency rate increases, these agencies will be able to sell their products at a higher price and also the price of the imported competitive products are increased and the competitiveness of the products of these agencies increases. Then, the increasing of the currency rate will follow with the increase of the profit and following this the manufacturing and productivity also will be increased. Therefore, the highest rate of currency rate will create the maximum profitability in such agencies.

There are other agencies that are required to import raw material for manufacturing their products. Therefore, the actual currency rate is equal to the expenses of raw material for them that with the a decrease in currency rate the expenses of manufacturing these products is reduced which in turn increases the profitability rate and improves the manufacturing rate as well as productivity. Therefore, the minimum level of currency rate can have maximum level of profitability in such agencies that import their own raw material (Kazerooni and Doolati, 2007).

Change in the actual value of currency rate indicates to the Strengthening or weakening of a national currency of a country against other currencies in other countries. Reduction in the actual value of a currency comparing to the balanced condition as well as prevention from deviation of the currency rate from the balanced condition causes to reduce the disturbances and fluctuations in other prices inside the country as well as increases the social welfare level and productivity. On the other hand, with developing societies, as well as Iran, getting rid of Single-commodity economies and creation of Diversification environment , increasing the number of exportable products and especially developing the industrial products are among the main needs and necessities of these societies.

Due to the dependence of the manufacturing and economic structure and basis of Iran to the import of Capital and intermediate goods the increase rate of productivity has been affected by changes in incomes obtained by the country through currency such that with improvement in the condition and situation of currency incomes often the import of capital and intermediate goods increase and following that the productivity also increases. Deviations of actual currency rates from a balanced state, i.e., in the state that the national currency is overvalued than its actual value, will cause to reduce the competitiveness power of local products in global commercial arena and will reduce the profitability of the productions. Similarly, deviations of actual currency rate will disrupt relative prices in the country and cause the departure of investors and wastage of the inputs and lack of optimized allocation of inputs (Izadi and Izadi, 2009).

Considering the above stated and the importance of understanding the effects of currency price which during the last few years have seen major fluctuations to it, the studies of the author have shown that unfortunately so far no consistent study has been conducted regarding the effect of currency rate on productivity of production factor and in line with the purpose the present research study the effect of actual currency rate on total productivity of production factors of industrial sector of Iran and in the following section the methodology, findings and conclusion will be presented.

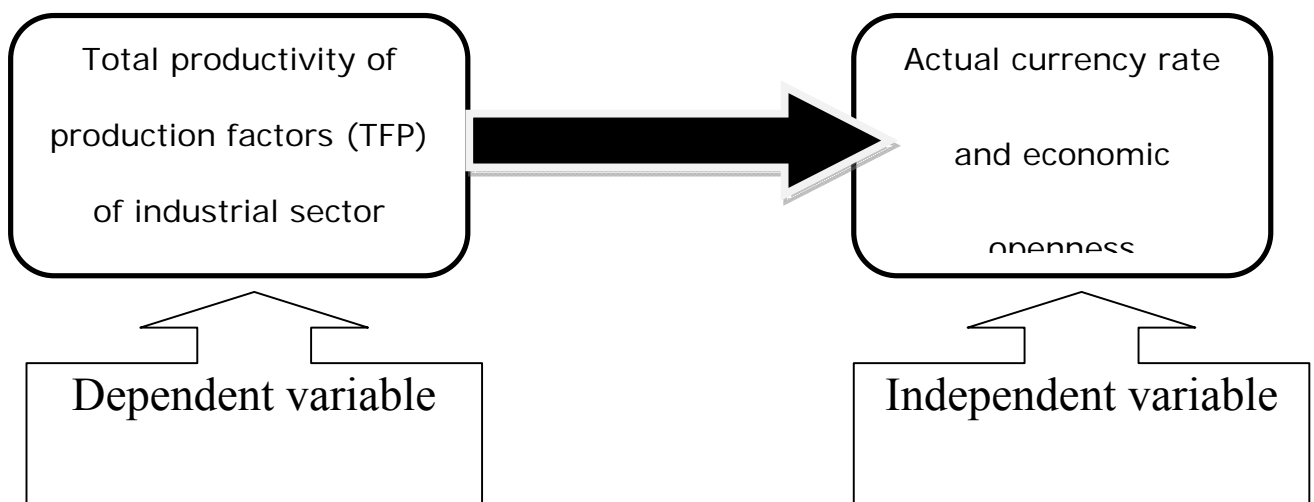
**Research methodology**

The present research is an applied research from aim point of view and a descriptive research from methodology point of view and from the point of view of data collection method is bibliographical which has been done by referring to libraries and sites and with the use of taking notes from different internet sites such as Central Banks, WDI, BLS and APO and Customs Statistics of Iran as well as face to face referral to the Macroeconomic Office of Management and Planning Organization, Statistics Center of Iran, National Productivity Organization of Iran, Institute of Business Studies and Research and the Ministry of Industry, Mine and Trade.

**Research model and variables**

Every conceptual model is the starting point and a basis for performing the studies and researches in a way that it will specifies the research variables and the relations between them. In other words, ideally it can be said that a conceptual model or the mental map and analytical tool is a strategy for starting and performing the study. In a way it is expected that a the time of executing the research the variables, the relationships and interactions between them will be studies and testes and in case of necessity some adjustments will be performed in them and some factors will be added to or deducted from them (Bazargan et al., 2009). The aim of the present research is to study the effect of actual currency rate on total productivity of production factor of industrial sector of Iran. Therefore, the research variables can be mentioned as per the following:

In the present study, total factor productivity (TFP) of production of industrial sector has been considered as dependent variable and actual currency rate and economic openness have been considered as independent variables.



**Figure 1: Research conceptual model**

$$\text{Log(TFP)} = \beta_0 + \beta_1 \text{Log(RER)} + \beta_2 \text{Log(PI)} + \beta_3 \text{Log(GI)} + \beta_4 \text{Log(FDI)} + \varepsilon$$

$$\text{Log(TFP)} = \alpha_0 + \alpha_1 \text{Log(Openness)} + \alpha_2 \text{Log(PI)} + \alpha_3 \text{Log(GI)} + \alpha_4 \text{Log(FDI)} + \varepsilon$$

The two above models are research models that were tested with the presence of control variables of private investment (PI), government investment (GI) and foreign division investment (FDI). In order to measure the effect of these variables the logarithm function of them has been used to explain the economic concepts of variables and their interactive behaviors against each other. We

should note that these models are not the final research model and are considered as a basis for obtaining the best model and it is possible that some of the variables will be present in the model in their main form and without the logarithm function, this will be performed based on the Goodness of fit indices of the models.

### Research findings

Concentration and dispersion indices of research variables have been presented in table 1:

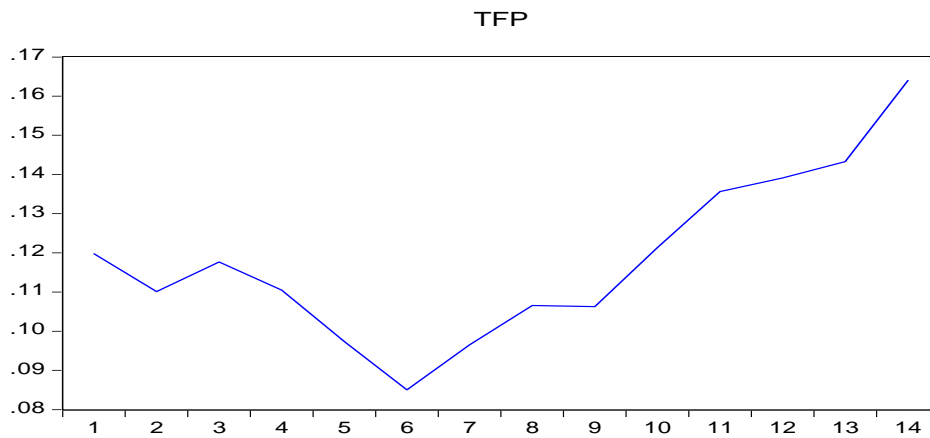
**Table 1: Descriptive indices of research variables**

Description	Total production factors	Actual currency rate	Private investment	Economic openness rate	Government investment	Foreign investment
Symbol	TFP	RER	PI	OPENNESS	GI	FDI
Average	0.1875	21510.52	11330.32	3.539	19619.22	436.893
Mean	0.2113	14397.86	302.4	2.965	390.4	12.3
Max.	0.4927	55737.71	45202	9.297	130231	2910.2
Min.	0.0850	3139.525	43	1.164	97.3	1.3
Standard deviation	0.0786	16452.63	14139.72	1.944	30495.01	924.301
Skewness	1.579	0.90946	1.1136	0.776	1.580	1.840
Kurtosis	7.812	2.3959	3.295	3.319	4.302	4.654
Jarque-Bera	5.547	5.0508	6.941	3.459	6.076	2.384
Sig. level	0.079	0.080	0.076	0.177	0.065	0.231

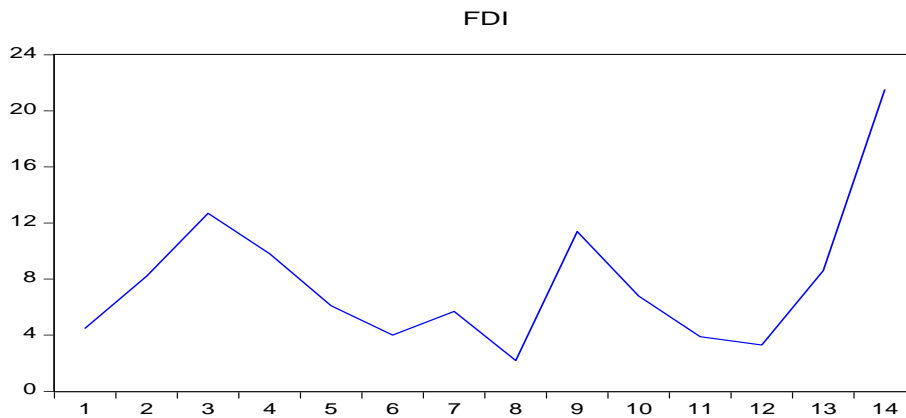
As the results of table 1 show, the average of total productivity of production factors during 33 years under study are equal to 0.1875 of a unit. This criterion for actual currency rate is estimated to be equal to 21510.52. Also, the average of private investment, government investment and foreign investment variables have been used as Covariates, which are equal to 11330.32 of unit, 19619.22 of a unit and 436.893 of a unit, respectively. The average of the index of economic openness during the years under study is equal to 3.539 of a unit. The Index of scatter of minimum and maximum and standard deviation for these variables also indicate that the total productivity of production factors as well as the economic openness degree during these years have a higher concentration around its average comparing to other variables and in other words, the changes rate in these two variables are more limited than the existing changes in other variables and have bore less fluctuations.

Also, the significant level of Jarque-Bera test which has been performed for conforming the normality of the variables score indicate that at 1<sup>st</sup> type error at 0.05 levels the normality assumption of the variables can be accepted and therefore the first pre-assumed regression model fit is established and we can fist the regression model with parametric method of OLS.

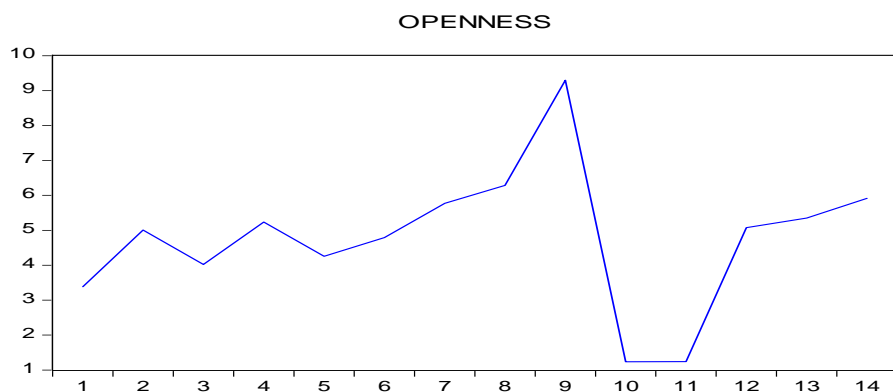
The following figures present the changes trend of independent, dependent and control research variables.



**Figure 2: Trend of independent, dependent and control research variables**



**Figure 3: Data adopted from WDI site**

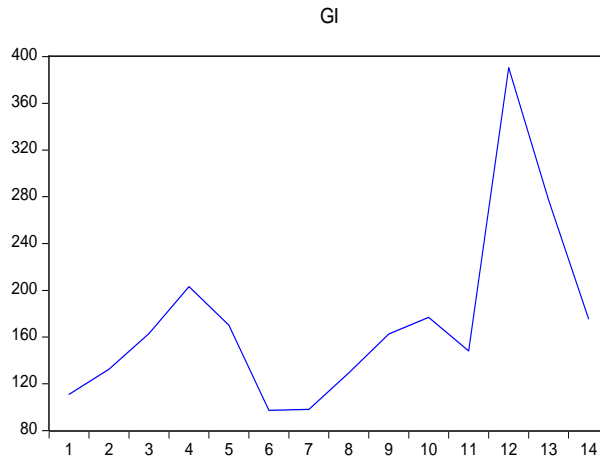


**Figure 4: Trend of independent, dependent and control research variables**

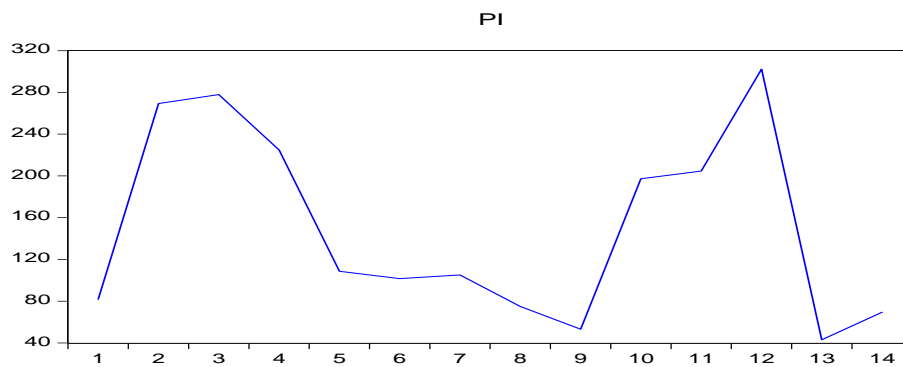
In the following with the use of yearly time series data related to years 1974 to 2006 which is a 33 year time period as well as with the use of Econometric method of OLS, we intend to study the effects of effective factor on total productivity of the factors of production in industrial sector of Iran. In addition to presenting descriptive indices of the research variables, with the use of adjusted



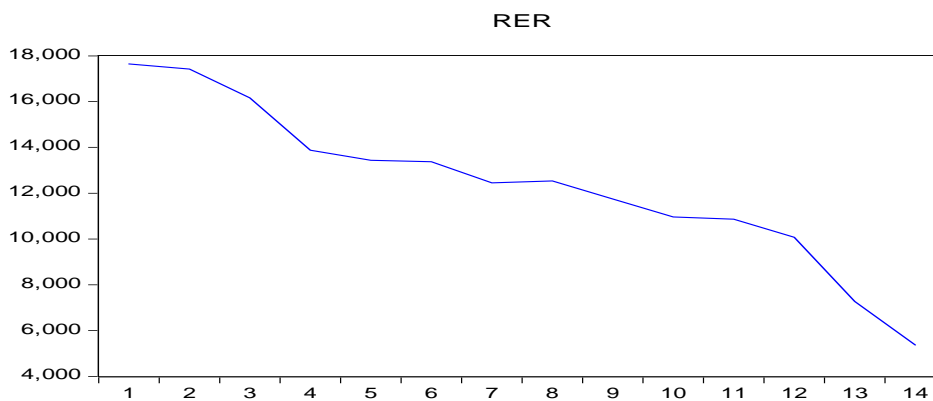
Dickey Fuller test the stationarity of the dependent variable series terms (total productivity of the factors of production) has been studied in the research regression model.



**Figure 5: Data adopted from the statistics center of Iran**



**Figure 6: Data adopted from Statistics Center of Iran**



**Figure 7: Trend of independent, dependent and control research variables**

After confirming the stationarity of these values, by using co-integration test, the dependency ability of the total productivity of the factors of production variable has been tested against independent and control research variables and the results of this test indicate that at 1<sup>st</sup> type

error level of 0.05, total productivity of the factors of production can be considered as dependent variable in the model. In order to study the research questions, regression model have been fitted for some functions of the research variables. In these models the use of logarithm function has been considered as the assimilation function of the variables in terms of Rial scale. The model fit results indicate that the logarithm of actual currency rate at 1<sup>st</sup> type error level of 0.05 have a significant effect on total productivity of the factors of production; therefore, the effect of this variable on total productivity of the factors of production is accepted at the level of error. With regards to the economic openness variable also it is seen that the existing stationary trends in this variable prevents the revealing of this variable on total productivity of the factors of production. Then, with the use of Hodrick-Prescott Filter, first the stationary trends of this variable have been eliminated from it and then have been entered to the model. The regression model fit for the adjusted values of economic openness indicate that this variable also after adjustment have a significant effect at error level of 0.05 on total productivity of the factors of production. As a result, this research hypothesis is also confirmed. Finally, during the multiple regression models fit, both independent variable together with research control variables have been entered in the model and it has been seen that economic openness and actual currency rate beside together with each other also have significant effect on total productivity of the factors of production. Considering the above results, the effect of economic openness and actual currency rate variables in a direct way or their adjusted effect on total productivity of the factors of production at 1<sup>st</sup> type error level of 0.05 has been confirmed.

### **Conclusion**

Currently productivity is not only being discussed in terms of a scale and feature in economy; because, productivity is a cultural topic that has a perspective toward all the existence dimensions and contains various situations which are the origins of numbers main changes. Productivity increase is effective on an increasing number of things in economic, cultural and social fields and is a well effective on improving the level of public welfare and reducing the economic and financial problems in the community. Hence, so many societies in order to achieve an increase and improvement in productivity in their country, have made considerable investments and in this way have increased their social levels and have achieved economical and expansion in development (Tavakoli et al., 1379).

Currently, productivity increase is one of the most important ways of achieving development in economy and society in various countries. Success in expediting the course of productivity improvement is among the fundamental conditions of reaching to decent conditions in International competition arena and improving the level of public welfare. Productivity improvement has some achievements including: correction of processes, correction in job relations, increasing interest and enthusiasm in work force, improving the level of public welfare in the society, reducing unemployment, improving the level of wages due to the increased level of production as well as increase level of agencies' profit.

Scarcity and limited amount of the existing inputs as well as the increase in population growth and the increase in the expectation level and demands of humans have made the Statesmen to give importance to productivity and its improvement and to consider it as the basics of other things.

Most of the developed societies, fee that they are Indebted their developments and advancements in economic arena and achievement of their high levels of social welfare to their given attention and their industrial sector and with bringing up various projects at national and international level they seek to develop the industrial sector as much as possible and to improve productivity in this sector. One of the important issues that different societies consider for

developing their Industrial Sector is the improvement of competitiveness of the agencies in international commercial arena. Therefore, countries for achieving a higher economic power in international commercial arena should solve their problems, challenges and limitations at national level and make changes in their economic structures with the aim of increasing the level of their productions and expanding their industrial products' export. Increasing productivity causes the international trade arena to become prominent and in this case the trade transactions will be in favor of the countries with higher productivity. Also, increased productivity, especially in tradable goods causes an increase in the power of the national currency. Therefore, conducting a research regarding the effect of actual currency rate on total productivity of factors of production in industrial sector is of importance and significant which has been studied in this research and the findings indicate a significant and reverse relationship between actual currency rate and economic openness degree with total productivity of factors of production in long-term. The results of this estimation indicate that due to the economic and industrial dependency of our country to imported capital and intermediate goods which have modern technologies inside them resulting from the outcomes of the research and development activities performed in developed countries, with an increase in actual currency rate the investment rate due to Capital goods becoming more expensive reduces which in turn will reduce the total productivity of the factors of production. On the other hand, with an increase in actual currency rate the power of the national currency decreases that increases the rate of industrial exports. Also, the relationship between economic openness degree and total productivity of the factors of production indicate that due to existence of some shortcomings in the country's structures and especially in the social structures an increase in economic openness degree decreases the total productivity of the factors of production in industrial sector. It is because due to lack of using work force in their specific place, lack of following relevant rules and regulations or lack of adherence to the rules, lack of customization of the imported technologies, lack of enough and required attention to research and development, lack of adherence to ethical criteria and staying away from things like rentier have caused the economy and the industry of the country to become fragile and lack the required competitiveness capability against industrial countries and considering the goals of the outlook paper they might even be dangerous for the country. Then, the government should as much as quickly take the measures for making necessary changes in the structures of the country in order to achieve sustainable economic growth and development.

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