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Investigating the Efficacy of Productivity of Production Factors in Gas Production of Iran

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Abstract: Recently we have witnessed an increasing trend on demand for gas energy. Due to the fact that the natural resources are scarce in the world, the main goal of the policy makers in Iranian economy is optimal assignment to the scarce resources. In fact achieving the peak output by use of available resource and least equipment is a top priority. In this research the goal is to answer this question that does increase in gas product occur by productivity production factors? And also is gas refinery capital intensive or labor-intensive? At first we collect periodical data and input data regarding the Iranian gas refinery. Econometrics method of Panel Data were used to estimate Cobb-Douglas production function based on six Iranian gas refineries data during 2002-2010. The results derived from Eviews and SPSS indicate that productivity production factors cause mass production and also Iran gas refineries are labor-intensive.

Key words: Labor productivity · Productivity capital · Production · Panel data

INTRODUCTION

In 21st century gas energy is one of the dominant energies. Iran is the second country that has this potential after Russia [1]. Because of gas special feature that is most important in Iran. Some features consist of: 1). have light expense into other energy such as gasoil, gasoline, kerosene and etc, 2). this fuel consumption causes reduction in environment pollution and also reduces the expenses of environment pollution removal. Today demand of energy is increasing and have tendency to gas energy every day. Europe has the most demand to achieve gas energy [2]. The goal of this research is to survey the efficacy of productivity of production factors (labor force and capital force), about gas product in Iran's gas refinery. For this purpose, in the first section we discuss about the research theoretical bases; that consist of bellow hypothesis:

- Productivity production factors cause mass production.
- Iran gas refineries are capital intensive.

The second section consists of subject literature and history of research. In this section we will consider some models studied about productivity in and out of Iran. The third section consists of statistic analysis about production factors in the eight Iran's gas refineries. The fourth section considers finding analysis, assumption tests and estimates the model. The result of these analyze by EVIEWS, STATA and SPSS software. The fifth section considers final result and also researcher suggestions.

Theoretical Issues: The word of productivity used to by Kane for the first time and this word published in the article in 1766.After several years' productivity definition mention power and might by Luther in 1883. Erli tells that there is relevance between output and available tool in the process of output product [3].

Productivity consists of coordination between value and method [4]. Productivity is the relationship between output of goods and services and the inputs of Resources [5]. Productivity is defined as the ratio of output to input for the specific production situation [6]. Stigel suggests that productivity is output ratio into the expenses of product operations. According to Mundel productivity is equal to quantity of output on one or total product factor.

Productivity of labor is $pu = q/u$, where pu is the productivity of labor, q is the physical scope of a product Q and u is the labor (precisely, the investment quantity of labor force) [7].

Labor productivity is a function of technology and the capital-labor ratio TFP is a geometrically weighted average of capital and labor productivity with factor intensity [8].

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The average productivity of a factor is output divided by amount of factor used [8]. The extra output that would be produced if an extra unit of a factor were used [8].

In the condition that we have many cheap labors, so that labor-intensive and capitalize are structured act. If the stock of capital product was very lot, refinery productive act will capital intensive and engagement, at the other hand we will confront to lack of labor.

$$\text{Labor productivity} = \frac{\text{output}}{\text{labor}} \quad (1)$$

$$\text{Capital productivity} = \frac{\text{output}}{\text{stock of capital}} \quad (2)$$

In fact labor force and capital productivity is per capita product for specific amount of labor and capital.

The Progress of Procedure in Labor Productivity should be the correlation between wage and productivity. Competitive factors should progress for expert labor employment and consider the research and development critical. The payment of subsidy facilities bank should be preferable into knowledge base act. It should correlate between didactic credit share at executive section and productivity in crescent at beneficiary section [9]

The Progress of Procedure in Capital Productivity: Reconsidering the methods of allocating construction budget resources to state projects to shorten the building period, prioritizing the completion of the production chain and further emphasizing the economic, technical and financial justifications of plans and also Reconsidering the method of determining the interest of bank loans for investment plans in order to decrease rent speculation and resource misuse are of great significance. Great efforts should be taken to develop the financial market. Allocating the financial resources of the government to executive bodies based on their efficiency (establishing a relationship between the budget and efficiency) is another issue related to the matter. The Central Bank's close supervision in the given loans and reducing credit misuses is a critical issue according the matters at hand [9].

The process of the physical or non-physical transformation of the production factors is called production [10].

Production depends on different factors such as labor force, capital, technology, lands etc and the most important of these i.e. labor force and capital will be investigated in this research.

The Production Function shows the mathematical form of the present relationship between the amounts of the employed production factors with the quantity of the produced goods [11].

Production function is an equation, table or chart that shows the maximum amount of the goods in any period of time and with any combination of different inputs can be generated [12]. The maximum amount of output that can be produced with K units of capital and L units of labor is defined as the production function [13].

The level and changes of efficiency in a given country can be indicated through the measurement of efficiency. When the efficiency is measured, it can be found through efficiency indices whether it has increased or decreased in that country every year. The real production can be shown by efficiency indices like GDP and gross profit. The increase in output does not absolutely imply the rise in efficiency; rather, the data might have only increased. It means that GDP can increase without any rise in efficiency. For instance, when the income of a production establishment goes up, it does not necessarily mean an increase in profit since there may be an increase in the expenditure and input spent in production. It should be noted that real statistics and numbers should be used in the calculation of efficiency indices instead of nominal numbers. For example, constant process should be used in calculating the input and output of a country instead of current market prices; otherwise, these statistics and numbers would not be calculated precisely with regard to the presence of inflation [14].

The Rise in Production does not always mean the rise in efficiency. Production means the total gained output. On the other hand, efficiency means the total produced output in relation to each unit of input applied. The following examples can be considered to state this problem.

Efficiency can decrease by different factors like the lack of technology, the absence of skilled labor and the application of an inappropriate production method which increases the costs [14].

The most important effect of improving efficiency is the growth in production. Accordingly, efficiency growth can accelerate production. The following equation shows the role of efficiency growth in growth rise:

$$\hat{y} = \eta_L \hat{\mathrm{L}} + \eta_{\mathrm{k}} \hat{\mathrm{K}} + \mathrm{T}\hat{\mathrm{F}}\mathrm{P} \quad (3)$$

In which $\hat{y}$, $\hat{\mathrm{L}}$, $\hat{\mathrm{K}}$ and $\mathrm{T}\hat{\mathrm{F}}\mathrm{P}$ are production growth, employment, capital and the total efficiency of the factors

respectively; moreover, η_k and η_L are production elasticity of capital and work respectively. As one can see in the above equation, more the efficiency growth is, higher the production growth will be. The share of efficiency growth in the production growth can be measured from the above equation as it is enough divide the total efficiency growth of all the factors by the production growth. A larger sum implies the desired performance of the economy in the optimum utilization of production resources [15].

The Characteristics of a Proper Production Function to be used in This Search are the nonlinearity of the selected function; the lack of too many parameters; the flexibility of the function: which means it should have many applications to be able to be used in other estimations; and the ability to interpreted parameters easily.

According to what was said so far and the simplicity of the function estimation method in the model of this research, the Cobb-Douglas production function will be used.

Khaksar [16] measured and analyzed efficiency in aluminum industry in Iran using the Cobb-Douglas production function and the constant elasticity of substitution (CES). He concluded that the fundamental metal industries of Iran are in better conditions than the whole industry. Also, Iran Aluminum Company (Iralco) is the first and the Markazi Province Fundamental Industries are the second in the ranking. In a research entitled "An economic study of the rural industries in Mazandaran" Sadeghi [17] measured the final efficiency of labor force, capital and all the production factors. He used the Kendrick Index to measure the total efficiency and found that the final efficiency of the labor force in the mineral, textile and metal industries of Mazanadaran is lower than that of other sections and also the total efficiency of production factors (capital and labor force) in chemical and cellulose industries is higher than that of other rural industries and had a negative and almost falling trend in the growth rate. Hejazi Azad [18] investigated the effective factors in labor force efficiency with an emphasis on the effect of hygiene and health. The results of the estimation indicated that the level of per capita physical capital and real wages had to be increased to reach higher efficiency of labor force. He also found that the lack of a wage determination system based on efficiency, the presence of unemployment capacities and the lack of capital facilities are some of the factors causing low efficiency growth in Iran. Serid haran and Chandereskan [19], analyzed the efficiency trend in labor force and capital in Indian cotton industry in 1972-1987. Having used the Cobb-Douglas production function, they concluded that the efficiency of the labor force in Indian cotton industry increased more than the efficiency of capital in the involved period. Atrostic and Neguin [20] carried out a study entitled "computer networks and the efficiency of production factories" in America in which they used cross-sectional data to study and analyze the effect of computer networks (CN) on the efficiency of the labor force and also used the Cobb-Douglas function for estimation. Those researchers found out that the efficiency of the labor force in a factory that uses computer networks is about five percent higher than that of others which do not use any. Having used CES in his research; Bonga Bonga [21] estimated the total production function in the economy of South Africa. He also used the Cobb-Douglas production function to model the total production function. He concluded that there is a complete negative (reverse) relationship between technological changes and the production scale. Furthermore, technological changes in South Africa are oblique i.e. they are experiencing growth without jobs.

All companies had a rising trend in both the fields of gas production and job creation; however, all of them experience some falls in some years which were mainly due to fundamental repairs in gas pipelines, refinery centers etc. the same reason also caused changes in import and export. The number of employees in each company either rose or fell with regard to the plans of the company for itself in the following year, the foundation of new phases or the retirement of some employees.

The Model and the Estimation Results: Different patterns have been designed to study the effect of the Cobb-Douglas function of the production factors on production. Regarding the production factors or the total production factors, each of these patterns investigate the production of different economic sections each specific to the defined place and period. As ITSC draws some conclusion through the use of the Cobb-Douglas Model in 2005 that was explained in chapter two, efficiency is studied using the same model in this research too. Therefore, the production function in this research is stated as:

$$Q = f(L, K) \quad (4)$$

Table 1: The variables and data sources of the model

Variable	Definition	Source
Q	The amount of the produced gas	Iranian National Gas Company
Q/L	the efficiency of labor of the Iran gas companies	Iranian National Gas Company
Q/K	the efficiency of capital of the Iran gas companies	Iranian National Gas Company
K/L	Capital ratio to labor	Iranian National Gas Company
A	The width of the center function	Research findings
β_1	Ratio of production labor (elasticity of labor productivity)	Research findings
β_2	Ratio of the amount of capital (investment elasticity of productivity)	Research findings
β_3	Capital to labor ratio (capital elasticity)	Research findings

The primary production function in a simple form:

$$Q = AL^{\beta_1}K^{\beta_2} \quad (5)$$

The model primary production function:

$$Q = A(Q/L)^{\beta_1}(Q/L)^{\beta_2}(Q/L)^{\beta\alpha} \quad (6)$$

The model variables are presented in Table 1.

Since the production function is the Cobb-Douglas production function, Ln should be calculated from the two sides of the equation for a more precise estimation and an easier analysis. Hence, the above equation will be changes into the following one:

$$\text{In } Q_{it} = \alpha + \text{In}\left(Q/L\right)_{it}^{\beta_1} + \text{In}\left(Q/L\right)_{it}^{\beta_2} + \text{In}\left(Q/K\right)_{it}^{\beta_3} + \varepsilon_{it} \quad (7)$$

Simplifying equation(7), equation(8) is obtained:

$$\text{In } Q_{it} = \alpha + ß_1 \text{ In}\left(Q/L\right) + ß_2 \text{ In}\left(Q/K\right) + ß_3 \text{ In}\left(Q/L\right) + \varepsilon_{it} \quad (8)$$

The researcher would like to answer the hypotheses of this research with the aid of estimating this function and the data from the gas refinery extracted from Iranian National Gas Company.

Econometric Methodology: Many of the recent studies in economics are of the panel data collection type. The analysis of the panel data is one of the new and applicable issues in econometrics since panel data is an environment very rich in information in order to extend estimation techniques and theoretical results. The most important characteristic of this method concerns the time when the problems cannot be studies merely as time series or in a cross-sectional way. The panel method will be used in this research due to the combined data available.

The advantages of combined data over the time series and cross-sectional ones are Combined data provide greater variety or higher variability, less co-linearity between variables and higher scales of freedom and effectiveness while time series suffer co-linearity; Since combine data are a combination of time series and cross-sectional data, the cross-sectional dimension causes the addition of a very high variability or variety which will lead to more valid estimations when these data are available; Combined data are richer than the cross-sectional samples (N) in terms of information. If time series are only used, the data would be as large as the observations (T), but the number of combined observations (N.T) will increase that can lead more efficient estimations of the parameters. Using cross-sectional observations may lead to oblique estimations of the parameters but this is not the case in combined data [22] (Data Researcher Statistical Website, 2011). Regarding to what was said so far, the combined data method, which is indeed the panel data in econometrics, will be used to estimate the model of this section. In this method, the production variables of the gas companies will be analyzed over time and the companies will be combined with each other with a time series.

In order to estimate a model, it should be first determined whether the random effect in more efficient or the constant one. Integrated data indeed include constant and random effects and it is necessary to determine the data panel estimation method to estimate the model. Therefore, F and Hussmann tests were separately used to determine the presence or absence of the width of the center. Next, the main estimation will be done with the aid of the panel data. Finally, the significance of the second hypothesis will be dealt with using SPSS and T-Test (one-sided test) and the T-Test will be as follows:

$$H_0 : \mu = 1$$
$$H_1 : \mu \neq 1$$

Important Note : F and Hussmann tests were estimated in Stata software program in a way that the estimations were conducted on the constant effects and the hypotheses were interpreted with regard to the constant effects.

It is necessary in panel data method to test the homogeneousness or heterogeneousness of the cross-sections first. When the cross-sections are homogeneous, the Pooled Least Square method can be easily used; otherwise, the Constant Effect method has to be used. In other words, the F-test can be used to indicate the significance of the constant effects that is shown as follows:

$$F_{(N-1,NT-N-K)} = \frac{\left(R_{UR}^2 - R_R^2\right) \Big/ N-1}{\left(1-R_{UR}^2\right) \Big/ \left(NT-N-K\right)} \quad (9)$$

In this model, N is the number of cross-sections, K is the number of explanatory variables and T is the number of observations over time. Also, the constant method will be used as an non-binding model (UR) and the pooling model as a binding model (r). The tested hypothesis is as follows:

$$H_0=\beta_{11} = \beta_{12} = ,,,,, = \beta_{1n}$$
$$H_1=\beta_{11} = \beta_{12} \neq ,,,,, \neq \beta_{1n}$$

The rejection of the null hypothesis indicates the significance of constant effects and the use of constant effects model. In order to decide whether to apply the random effects method or the constant effect one, we should thus note that the const effect method will work when the whole population is involved while if samples are randomly selected from a large population, the random effect method will be more efficient [23].

Regarding the estimation of the F-test, it can be seen in Figure1. that the probability of this test is equal to 0.9314 (P=0.9314). It means that H0 implying the excessiveness of the constant effects is accepted but the significance of constant effects is rejected. Random effects are thus more efficient than constant ones. Table 2.Also contains Hussmann test in which the probability equals (P>chi2 =0.5091) and means the acceptance of H0 and the higher efficiency of random effects of constant ones. Then, considering Table2, which shows the output of EVIEWS for the panel data, the t-statistic is significant at a 95% reliability level for the variables $\left(Q/L\right)$ and $\left(Q/K\right)$ as they are (PL=4.43) and

```
. xtreg q pl pk kl, fe

Fixed-effects (within) regression               Number of obs      =        54
Group variable: year                            Number of groups   =         9

R-sq:  within  = 0.2577                         Obs per group: min =         6
       between = 0.2719                                        avg =       6.0
       overall = 0.2589                                        max =         6

                                                F(3,42)            =      4.86
corr(u_i, Xb)  = 0.0167                         Prob > F           =    0.0054

------------------------------------------------------------------------------
           q |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          pl |   549.9228   148.9023     3.69   0.001     249.4257    850.4198
          pk |  -21.85435   12.64321    -1.73   0.091    -47.36939    3.660688
          kl |  -20.57114   11.49184    -1.79   0.081    -43.76261    2.620326
       _cons |   14.80779   4.217313     3.51   0.001     6.296905    23.31867
-------------+----------------------------------------------------------------
     sigma_u |  4.2937068
     sigma_e |  14.200478
         rho |  .08376555   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(8, 42) =     0.37                 Prob > F = 0.9314
```

Fig. 1: Stata output, F-test

Table 2: EViews output, Panel test

Dependent Variable: LNQ?
Method: Pooled EGLS (Cross-section random effects)
ate: 10/17/11 Time: 18:54
Sample: 1381 1389
Included observations: 9
Cross-sections included: 6
Total pool (balanced) observations: 54
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.131699	0.464354	15.35831	0.0000
LNPL?	0.194309	0.043786	4.437739	0.0001
LNPK?	0.989630	0.102910	9.616499	0.0000
LNKL?	0.952087	0.057188	16.64823	0.0000
Random Effects (Cross)				_HAS--C
	0.277205			
_SAR--C	-0.587407			
_BID--C	0.100609			
_JAM--C	0.349363			
_PAJ--C	0.882642			
_PAS--C	-1.022411			

Effects Specification		
	S.D.	Rho
Cross-section random	0.615069	0.8974
Idiosyncratic random	0.207935	0.1026

Weighted Statistics			
R-squared	0.894941	Mean dependent var	0.260348
Adjusted R-squared	0.888638	S.D. dependent var	0.631924
S.E. of regression	0.210879	Sum squared resid	2.223502
F-statistic	141.9746	Durbin-Watson stat	0.419908
Prob(F-statistic)	0.000000		

(PK=9.61) respectively and the coefficients of these two variables are 0.19 and 0.98 respectively. These coefficients show that capital efficiency elasticity in Iranian gas companies is more than labor force efficiency elasticity and they are interpreted as:

Production increases by 0.19 percent with one unit increase in labor force efficiency; production also increase by 0.98 percent with one unit increase in capital efficiency. According to the research findings, it can be seen that there is a positive and significant relationship between the efficiency of production factors (labor force and capital) and the production of Iranian gas companies i.e. production goes up with the rise in the efficiency of production factors. It should be noted that the efficiency of capital is higher than that of labor force. Given the T-Test in Table 3. It can be seen in the last stage that p-value is smaller than α (.sig.(2-tailed)=p-value=0.000<0.05=α). So there is no reason to confirm H0 and the absolute value of t will be 14.29 indicating the significance of t. Given this test, the second hypothesis supposing that gas companies are wealthy is rejected and gas companies are users then

CONCLUSIONS

The present research has analyzed the data in Iranian gas refineries. The efficiency of the production factors in the production of the gas section. Considering the charts of the gas companies in chapter three, it is concluded that in sections where production increases or decreases, the main reason for the increase is the establishment of new phases inside the refinery. On other hand, the main reason for the production decrease was the explosions in gas pipelines. Concerning the labor force, the main cause of the rise in the employees was the employment by the companies while the main reason for the fall was employees' retirement. The numbers and statistics related the production, labor force and capital were extracted by the Iranian National Gas Company and the involved period in this research included 2002-2010 and its place includes six gas refineries in Iran. The results of the estimation reveal that, regarding the panel test in Table the t-statistic is significant at for the variables $\left(Q/L\right)$ and $\left(Q/K\right)$ as they are (PL=4.43) and(PK=9.61) respectively and the coefficients of these two variables are 0.19 and 0.98 respectively. These coefficients show that capital efficiency elasticity in Iranian gas companies is more than labor force efficiency elasticity. On the other hand, production increases by 0.19 percent with one unit increase in labor force efficiency; production also increase by 0.98 percent with one unit increase in capital efficiency. Hence the first hypothesis assuming the positive relationship between the efficiency of production factors (labor force and capital) and gas production is confirmed. It means that production goes up when efficiency rises. Moreover, the second hypothesis which states that Iranian gas companies are wealthy is rejected and these companies are confirmed to be users.

Suggestions: The following suggestions are made according to the obtained results:

- Since the main goal of economics if the optimum allocation of rare resources while world resources are being destroyed, the developed countries should move towards efficiency. Actually, the efficiency achieved with the lowest cost and fewest production factors. Iran, as a developing country, is moving towards efficiency in order to waste less natural resource and save it for future generations.
- Since efficiency is one of the important factors in development, Iran should reach the best efficiency conditions to reach development and welfare.

- Iranian gas companies should pay a lot of attention to the geographical conditions of each area in order to reduce the extra costs imposed to transfer gas. These costs include: the explosions in pipelines due to the impassability of gas pipe tracks and the explosions made in export pipes by bandits. An example of the latter explosions includes the several explosions in the gas transfer line from Iran to Turkey and imposed a lot of cost to Iran.
- Accordingly, this research indicated that capital efficiency is higher than the efficiency of the labor force in gas companies. But in case gas companies are users, the government should provide the necessary conditions for increasing the production in which whether foreign and Iranian investors will be able to invest more easily in energy-related fields.

REFERENCES

1. Iranian Journal of Economic Research. 2003. 16: 151-133, Fall.
2. Asadi, H., 2006. Iran's role in securing future gas demand in Europe about 25 years.MS Thesis, University of Imam Sadeq (AS), Tehran.
3. Alvanchi, M. and M. Sabouhi, 1997. Productivity growth in wheat production in Iran. Paper Zabul Department of Agricultural Economics, Published.
4. Journal of Communications and the efficiency of post. 1996. Telegraph and Telephone, the First Year, April.
5. Centre for the Study of Living Standards, 1998. Productivity: Key to Economic Success. 111 Sparks Street, Suite 500, Ottawa, Ontario K1P 5B5, 613-233-8891Fax 613-233-8250 csls@csls.c.
6. Rogers, M., 1998.The definition and Measurement of productivity. Melbourne Institute of Applied Economic and Social Research, The university of Melbourne, Melbourne Institute working Paper No. 9/98.
7. Grozdanović, D., M. Milojević and V. Jablanović, 1998. Some elements of the inter dependence between the Productivity function and the Production function of two variables. The scientific journal facta Universit atis.Economics and Organization, 1(6): 1-12.
8. ITSC, 2005. Productivity chap4, the Theory of Aggregate Supply, HKUST.
9. Weekly News Analysis Program. 2011. He ninth year, number 413, Persian date Ordibehesht.
10. Abonori, A., 2009. Microeconomics, Islamic Azad University Central Tehran Branch, First Edition, Volume II. Tehran. Iran.
11. Henderson, J.M., 1929. Microeconomic theory. New York, McGraw-Hill 1971. (OCoLC)581982889
12. Salvatore, D., 1992. Dominick. Schaum's outline of theory and problems of microeconomic theory.3rd ed. p. cm, (Schaum's outline series) Includes index. ISBN 0-07-054515-4 1.Microeconomics. I. Title. II. Series. HB172.
13. Baye, M.R., 2006. Maragerrial Economics and Business Strategy Chapter 5 the Production Process and Costs, the McGraw-Hill companies, Inc.
14. Askari Nejad, M., 1999. Factors affecting sturgeon productivity in the province. Master's thesis, University of Mazandaran nonprofit Science and Technology, April.
15. Zare zadeh, M., 2010. Examining the relationship between poverty and labor productivity in the economy, Iran. MS Thesis, University Firoozkouh Unit.
16. Khaksar. 2006. Measure and analyze the efficiency in the aluminum industry in Iran. J. Economic Research, Sixth Year, the First Issue, Spring.
17. Sadeghi, 2004. The productivity of rural industries in Iran. Quarterly Economic Research, No. 14, Winter.
18. Hejazy Azad, Z., 2005. Analyze and evaluate health role in improving labor productivity in the Iranian economy. master's thesis, Azad University Central Tehran Branch.
19. Srid haran and Chndarskan, 1993. (olive oil race Mousavian, Syed Ali, the estimated production function to measure total factor productivity growth in the mining sector in Iran. MA thesis, Faculty of Human Sciences, Azad University Firoozkouh, (2009).
20. Atrosic, B.K. and S.N. Nguyen, 2002. Computer Networks and us Manufacturing plant Productivity ; New Evidence from the CN us Data. Center for Economic studies, us census Bureau. Washington. DC.
21. Bonga Bonga, 2005. Olive oil race Mousavian, Syed Ali, the estimated production function to measure total factor productivity growth in the mining sector in Iran. MA thesis, Faculty of Human Sciences, Azad University Firoozkouh, 2009.
22. http://www.dpzs.ir/data/index.aspx
23. Mohammad zadeh, P.H.D.P. and S. Mamy Pour and M. Feshari, 2010. Stata software applications in econometrics. the first volume, published by the light of science.