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Evaluating the Relationship between the Energy Consumption and the Macroeconomic Indicators

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Abstract: This study aims to evaluate the relationship between the energy consumption and macro-economic variables in order to explain the relationship between the Gross Domestic Product (GDP), inflation, Economic growth and employment and the energy consumption during 1360 to 1390. This study is applied based on the purpose and the library type based on the data collection and among the correlation studies based on the method and are seeking to explain the relationship and calculation of correlation rate and coefficients of each independent variables with the energy consumption by using econometric models. Data and information needed for the research are collected based on document library studies and information related to research variables by referring to the websites of Central Bank and Statistical Center of Iran. First, the significant relationship between the independent and dependent variables was studied by Pearson correlation coefficient test and then the reliability determining tests, such as the Dickey-Fuller unit root test, were used in order to determine the reliability or stability of variables used in various forms. The accuracy test of classical assumptions was done for estimated functions and assurance of desired estimations accuracy and assurance of estimated relationship and long-term and balance coefficients of independent variables. Evaluation of stability (Durability or reliability) of variables was done by E Views software and the statistics R^2, F and Durbin-Watson were used in the analysis as the outputs of software. The tests of classical assumptions accuracy and residual term reliability were done after estimating the model in order ensure the accuracy of regression results and implementing the relations and coefficients in the long term. Consequently, by conducting this study it was found that there is a significant correlation between the macroeconomic indicators (GDP, CPI, Economic growth and employment) and the energy consumption.

Keywords: Economic growth, employment, energy consumption, Gross Domestic Product (GDP), inflation rate

INTRODUCTION

Since the beginning of creation, the human has realized the importance of energy for surviving and has always spent a significant portion of his power in supplying the required energy. Energy use in various countries is different according to their degree of development and since all countries have no equal level of development, the relationship between the energy consumption and its efficiency with the economic growth in various countries is different. Considering that the developing countries are in transitional and early stages of development, their energy consumption has higher growth than the developed countries. Moreover, the developing countries are different in terms of access to the energy resources such as oil, gas and coal. Some of the countries have high consumption due to easy access to the energy resources and the other groups lack these resources and spend high costs on importing the energy. Therefore, the energy sector is among the major economic sectors and has an effective role in the development of other sectors. There are different perspectives on the energy consumption and macroeconomic indicators. However, the current perspectives on the relationship between the energy consumption and macroeconomic indicators can be classified into two main categories. In the first viewpoint, it is supposed that there is sustained and substantial relationship between these two components. The second viewpoint, which was raised in the 80s, believes in the lack of a sustained relationship between the energy consumption and macroeconomic economical indicators. In the first viewpoint, a maximum growth rate in considered for the economy and high energy is required in order to achieve that growth rate and therefore the investment should be done for providing the energy in the future. Thus, limited energy supply leads to the reduction results and even negative growth in economic indicators. Opponents of this viewpoint argue that there is no sustainable relationship between the economic growth and the energy consumption. Because the economic indicators such as GDP, which is the value of tradable economic activities in a society, is a combination of very diverse economic activities in a country and this economic indicator has a very little correlation with physical factors which determine the energy consumption.

Author tries to evaluate the relationship between the Energy Consumption and the macroeconomic indicators in this study.

LITERATURE REVIEW

In this section, the theoretical and research background, necessity for conducting the research, research methodology and research findings are presented, respectively. In this study, the macroeconomic variables are the indicators of GDP, inflation rate and employment and the definitions and conducted research in this regard are presented as follows:

Theoretical principle and research background: The indicator and criterion of energy consumption is the intensity of energy consumption which means the final cost of fuel per GDP of production unit and this indicates that to what extent the energy is spent and consumed for each product. Several indices have been developed and used for measuring the amount of energy consumption in macroeconomic and industries sectors. Some of these indicators are the Energy Consumption (Million barrels of oil equivalent), Growth of energy consumption (%), Average Growth during the period (%), Value Added (Billion Rials), growth of value added (%), average growth during the period (%), energy coefficient, average energy coefficient during the period, energy consumption intensity (%), average energy consumption intensity (%), Energy efficiency (Billion Monetary units per 1 per one million Barrels) and the average energy efficiency during the period (Billion Monetary units per a million barrels).

In the Economic literature, the production is generally categorized as three factors of labor, land and capital as the production factor. In contrast, some of the development economists and theorists have considered the energy as one of the production factors. Since each of the factors of work, land and capital need the energy for production and its own keeping; some of the economists such as Cleveland have suggested more importance for the energy in the economic products and considered the energy as the main factor and prior to other factors. Theory Above advocators generally begin their own discussion with the assumption of Energy importance more than other factors and consider a less portion for other production factors. On the other hand, the neoclassical economists like Brent and Nissen believe that the energy is not an important factor in the economic growth. Based on David Stern's view, the Neoclassic strongly suppose that the energy can affect the economic growth by certain ways and this assumption has influenced the structure of their experimental research. His research based on determining the relationship between the energy and economic growth, that there is a correlation between the final energy consumption and the economic growth, has affected them; so that he has considered the final energy consumption as one of the important factors in Gross Domestic Product.

Research indicates that there is an appropriate relationship between the increased energy consumption and the economic growth. In developing countries such as America, England and Japan, the production growth had been 3.4, 1.3 and 1.4% and their energy consumption growth had been 3.4, 1.3 and 1.4% during the years 1980-1990. While, Iran Gross Domestic Product growth was only 0.6% during this 10 years, but the energy consumption growth has been reported 6.2%. Above issue indicates that the energy consumption growth has not been inconsistence with the growth production and in the energy consumption is reduced partly, the production of country will not be damaged. The high ratio of energy consumption growth to the growth domestic product Impure can be due to different reasons which need to be reviewed. Library studies in relation to the subject of this study have collected the excerpt of scholars' research in the field of relationship between the energy consumption and other economic indicators.

Stern (1993) evaluated the relationship between the Gross Domestic Product and the energy consumption in the United States during the year 1947-90 by using the Vector Auto Regressive (VAR) method. Furthermore, the relationship between the energy consumption and the capital and labor was also studied. Masih and Masih (1996) evaluated the relationship between the energy consumption, real income and prices by using data of two countries including South Korea and Taiwan during the years 1961-91 and by applying the Error Correction Technique and the Vector Auto Regressive method. Cheng and Lai (1997) investigated the relationship between the energy consumption and economic growth and also the relationship between the employment and the energy consumption by using the co-integration techniques for Taiwan and using annual data during 1955-93. Glasure and Lai (1997) analyzed the relationship between the energy consumption and GDP for South Korea and Singapore by using data for the period 1961-90 and applying the co-integration method and the error correction model. Asafu-Adjaye (2000) studied the relationship between the energy consumption, price and economic growth in the developing Asian countries. Zibaei and Tarazkar (2004) have evaluated the short and long-term relationships between the value added and consumption of different energy carriers in agriculture by using Joselious-Johansson co-integration test in the framework of their own model during 1346-79. Maleki (1999) studied the Granger relationship between the energy consumption and the economic growth in Iran during 1360 to 1376

Table 1: Comparing the conducted studies

Researcher name	Year	Working area
Paul H. Waleenbach	1973	Financial accounting
Berndt and Wood	1975	Technology, prices and the derived demand of energy
Stern	1993	Energy and economic growth in USA energy economics
Maish	1996	Energy consumption real income temporal causality
Cheng and Lai	1997	An investigation of co integration and causality between energy consumption and economic activity
Cheng and Lai	1997	An investigation of co-integration and causality between energy consumption and economic activity in Taiwan
Glasure and Lee	1997	Co integration and error correction, and the relationship between GDP and energy
Meleki, Reza	1999	Evaluating the casualty relationship between the energy consumption and economic activity in Iran
Yang	2000	A note on the causal relationship between energy and GDP in Taiwan
Assfu-Adjaye, J,	2000	The relationship between energy consumption, energy price and economic growth
Abrishami and Mostafaei	2001	Evaluating the relationship between the economic growth and consumption of major oil products in Iran
Fatai *et al*.	2004	Modeling the causal relationship between energy consumption and GDP in New Zealand
Zibaei and Tarazkar	2004	Evaluating the relationship between the short and long term value added and the energy consumption in the agricultural sector
Vafi Najar Darioush	2005	Statistical analysis and evaluation of granger-causality relationship between the GDP and energy consumption and calculating the input energy elasticity by using the production function
Lui	2009	Exploring the relationship between urbanization and energy consumption in China
Burke	2010	Energy ladders of supply and demand
Arseneau	2010	An international perspective on oil consumption over the business cycle
Arbex and Perobelli	2010	Solow meets Leontief: economic growth and energy consumption
Shahbaz and Hooi	2012	Dose financial development increase energy consumption?

by using the error correction patterns. Abrishami and Mostafaei (2001) investigated relationship between the economic growth and consumption of major oil products during 1338 to 1999. Vafinajar (2005) studied the relationship of Granger-causality relationship between the energy consumption and the Gross Domestic Product in Iran during the time period 1346 to 1381 by using Engle-Granger test. Berndt and Wood (1975) directly analyzed the relationship of the energy as an input along with other inputs in the production. Cheng and Lai (1997), found a one-way causality relationship from Gross domestic product to the energy consumption during 1993-1955 for Taiwan by using Hsiao's Granger causality test. Yang (2000), examined the Granger Causality between the energy consumption and GDP by using the standard Granger causality test and data related to the period 1954 to 1997. He also investigated the relationship of Granger causality between the Gross Domestic Product and consumption of energy carriers. Fatai *et al*. (2004) studied the relationship of Granger causality between the energy and real product growth of New Zealand and Australia during 1960 to 1999 in order to evaluate the possible effects of energy consumption saving policy on the real growth. Burke (2010) raised the discussion of energy ladders and supply and demand and variables and policies governing it. Arseneau (2010) investigated the international prospects of energy consumption and its impact on business cycles. Arbex and Perobelli (2010) studied the variables of economic growth and energy consumption. Shahbaz and Hooi (2012), investigated and examined the relationship between the economic development and increased energy consumption. Lui (2009) studied the relationship between the urbanization and the energy consumption in China. A comparative table of recent research is presented chronologically as follows (Table 1).

Need for research: Governments implement different policies for creating the economic balance. Governments control the economic markets, set the prices and supervise distribution of wages, commodities and other service activities. But evaluating the relationship between the macro-economic indicators and the production factors such as the energy factors plays a special role in the economic balance and establishment of social justice. The energy and sources of supplying it for industries are among the key factors especially in recent years. Increase price of energy products and carriers for the workflow of industries and subsequently the economic effects of these activities in the society are among the most important and comprehensive economic issues in the society. Communities, involved in high inflammation and beyond it the inflammation in recession, require the strategies for reducing the cost of industrial products and increasing the production simultaneously in order to fight against the inflation. Therefore, the study and evaluation of relationship between the energy factors and other macro-economic indicators help to find the roots of problems and propose the relevant solutions.

RESEARCH METHODOLOGY

This research is applied based on the objective, with library type in terms of data collection and is considered as the correlation method according the method because we are seeking to explain and calculate the relationship between the amount of correlation and coefficients of each independent variable

(Macroeconomic variables) with the energy consumption by using the econometric models. Data and information needed for the research are collected based on document library studies and information related to research variables by referring to the website of Central Bank, economic indicators and website of Statistical Center of Iran. Information related to the research variables covers the years 1357 to 1387 (in field of Iran economy) annually. In this study, first the reliability determining tests, such as the Dickey-Fuller unit root test, were used in order to determine the reliability or stability of variables used in various forms.

The major objective of this study is to investigate the relationship between the energy consumption and macroeconomic variables.

Mathematical function and conceptual model of research: In order to develop the main question, this question is raised whether there is a significant correlation between the energy consumption as the dependent variable and the macroeconomic indicators as the independent variables? In response to this question, research hypotheses are determined as follows:

Main hypothesis:

There is a significant correlation between the energy consumption as the dependent variable and the macroeconomic indicators (Gross Domestic Product, inflation rate, economic growth, employment rate) as the independent variables.

Subsidiary hypotheses:

- There is a significant correlation between the Gross Domestic Product and the energy consumption.
- There is a significant correlation between the inflation rate and the energy consumption.
- There is a significant correlation between the economic growth and the energy consumption.
- There is a significant correlation between the employment rate and the energy consumption.

Model used in this study consists of a dependent variable which is the energy consumption and four independent variables including:

- Gross Domestic Product (GDP)
- Inflation rate with Wholesale Price Index (CPI)
- Economic Growth (G)
- Employment rate (L)

Thus, the research model is displayed as the following function.

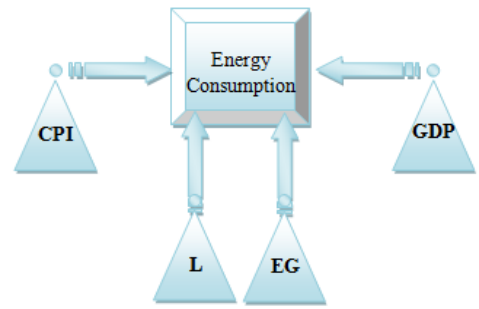

Fig. 1: Conceptual model of research

$$\theta = C + \beta_1 GDP + \beta_2 CPI + \beta_3 EG + \beta_4 L + \varepsilon_i$$

In the above equation:

θ : The energy consumption
C : Constant coefficient
GDP : Gross Domestic Product
CPI : Wholesale price index or inflation
EG : Economic growth
L : Employment rate
ε_i : Error term
β_1 To β_4 : Coefficients of independent variables

Conceptual model for the relationship between the independent variables of research (Inflation rate, Gross domestic product, economic growth, employment) with the dependent variable (Energy Consumption) is as follows (Fig. 1).

RESEARCH FINDINGS

Research findings for proving the main hypotheses have been found by the Pearson correlation coefficient test. SPSS software has been used for calculation.

Results of correlation coefficient for the main hypotheses:

H_{01}: There is a significant correlation between the GDP and the Energy Consumption.
H_{11}: There is no significant correlation between the GDP and the Energy Consumption.
H_{02}: There is a significant correlation between the Inflation Rate and the Energy Consumption.
H_{12}: There is no significant correlation between the Inflation Rate and the Energy Consumption.
H_{03}: There is a significant correlation between the Growth Economic and the Energy Consumption.
H_{13}: There is no significant correlation between the Growth Economic and the Energy Consumption.
H_{04}: There is a significant correlation between the Employment Rate and the Energy Consumption.
H_{14}: There is no significant correlation between the Employment Rate and the Energy Consumption.

Table 2: Pearson correlation coefficients of dependent and independent variables

Independent variables	Correlation coefficient	Sig.	Test results
Gross domestic product	0.017	0.001	A significant direct correlation
Inflation	0.050	0.000	A significant direct correlation
Economic growth	0.024	0.002	A significant direct correlation
Employment	0.020	0.004	A significant direct correlation

Table 3: Result of stable test by using dickey-fuller unit root test for GDP at the level

		t-statistic	Prob.*
Augmented dickey-fuller test statistic		2.307664	0.9997
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

Has a unit root null hypothesis: GDP; Exogenous: constant; Lag length: 0 (Automatic based on SIC, MAXLAG = 5); *: MacKinnon (1996) one-sided p-values

Table 4: Result of stable test by using dickey-fuller unit root test for GDP at the level in the first order difference

		t-statistic	Prob.*
Augmented dickey-fuller test statistic		-5.804393	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

Null hypothesis: GDP has a unit root; Exogenous: constant; Lag length: 0 (automatic based on SIC, MAXLAG = 5); *: MacKinnon (1996) one-sided p-values.

In the following Table 2, the main hypothesis test results, are presented.

The value of GDP coefficient has been equal to 0.017, Inflation equal to 0.050, Economic growth equal to 0.024, Employment equal to 0.02 and their significance level (Sig) less than 5% and this suggests that all variables have had a significant and direct correlation with the energy consumption and this correlation is approved with significant level 99%. Therefore, the hypotheses H_{01}, H_{02}, H_{03} and H_{04} are confirmed.

Sustainable (durability or reliability) evaluation of variables: Conducted surveys indicate that the variables are unsustainable about many economic time series. Thus, according to the co-integration theory in modern econometrics, conducting the research on the reliability or unreliability is essential. Dickey-Fuller unit root test is the most appropriate test. Null hypothesis p = 1 means that the time series have the unit root and are unstable. Considering that the actual process of data production is without the y-intercept, if the calculated quantity of desired statistic is more than the critical value provided by Dickey and Fuller (quantity of MacKinnon), the null hypothesis will be rejected in favor of the opposite hypothesis and we will have the unstable time series. In other words, we compare the statistics of ADF test or calculated t of desired delay variable with the critical values of MacKinnon in this method. If the obtained t value was smaller than the critical values, we conclude that the desired variable is stable. Given the prolongation of results, the process of this test is described by software E Views for one of these variables and the results are presented for other variables. Stable test has been done by Dickey-Fuller unit root test for the variable Gross Domestic Product (GDP) and the results are shown in the following table (Table 3).

Table 5: Dickey-fuller test results for time series data of research variables

Variable	Dickey-fuller statistics	MacKinnon critical maximum	Result	Degree
GDP	2.30	-2.61	Unstable	I (1)
D (GDP)	-5.80	-2.61	Stable	
CPI	-1.476	-3.610	Unstable	I (1)
D (CPI)	-6.060	-3.615	Stable	
EG	1.27	-3.661	Unstable	I (1)
D (EG)	-4.71	-3.670	Stable	
L	-4.55	-2.611	Stable	I (0)
θ	-8.42	-3.621	Stable	I (0)

Research finding

Table 6: Estimating the econometric model by using the ordinary least squares method

Variable	Coefficient	S.E.	t-statistic	Prob.
GDP	0.0061	19.26426	2.136452	0.0002
CPI	0.0048	65413.54	4.125441	0.0003
EG	0.0009	564.3215	1.984289	0.0001
L	0.0012	39.23512	3.254831	0.0004
C	2345682	12954648	0.256415	0.8145
R-squared	0.89315	Durbin-Watson stat		1.96431
F-statistic	114.360			
Inverted AR roots	1.00	0.05		

Dependent variable: economic growth; Method: least squares; Sample (adjusted): 1359 1388; Included observations: 30 after adjustments

Based on the below table the calculated statistic (2.30) is higher than the estimated critical values (at all levels of 1, 5 and 10%, respectively). Therefore, it can be concluded that this variable is unstable at the level. Thus, we examine the reliability of this variable in the first order difference. Result is presented in Table 4.

Table 7: Results of dickey-fuller test for the residual term

Variable	Dickey-fuller statistics	Highest Mackinnon critical statistics	Number of interruptions	Results
Regression residual term	-8.55	-3.65	0	Hypothesis of significant relationship is rejected

As can be seen the calculated statistic (-5.80) is less than the estimated critical values (at all levels). Therefore, it can be concluded that this variable (In the first order difference) is stable. In short, the results of mentioned tests at the level and in the first order difference of time series model are presented for all variables of model in Table 5.

Symbol D in the table represents the first order difference of variables. Therefore, except for the variables including the GDP, CPI and EG, which are stable in the first order difference, the other variables are stable at the levels. Thus, the final result of stability tests determine that the research variables become stable at the level or in the first order difference, thus we can fit the target patterns by determining the stable degree of variables and no problem is made for the models in this regard.

Estimating the coefficients of model and variables: Results of estimating the above model by the least squares method and by the help of E Views software is presented in Table 6.

The coefficients of model are calculated as follows by using the Table 5.

Estimation equation:
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$\theta = C + \beta 1 * GDP + \beta 2 * CPI + \beta 3 * EG + \beta 4 * L$

Substituted coefficients:
==========

$\theta = 2345682 + 0.0061\ GDP + 0.0048\ CPI + 0.0009\ EG + 0.0012\ L$ (3.29) (5.86) (2.76) (2.03) (2.03)
$R^2 = 0.89$ D.W = 1.96 F-statistic = 114.36

Interpretation of test results: The results of estimating the final model and the calculations and tests are presented as follows:

- t statistics indicate the significance of all explanatory variables at the significant level 95%.
- R^2 statistic indicates that 89% of changes in dependent variable (Energy Consumption) can be explained by the explanatory variables of the model and this suggests the high explanatory power of model.
- High F statistic of the model (114.36) indicates the overall significance of regression.
- Durbin-Watson Statistic in the model equal to 1.96 rejects the hypothesis of self-correlation between the components.

Estimated results of model for the t statistic of variables indicate the approval of each four research hypotheses. In other words, the results of research indicate that:

- Gross Domestic Product has a significant direct correlation with the energy consumption.
- Wholesale price index of consumable goods or services or inflation has a significant direct correlation with the energy consumption.
- Economic Growth rate has a significant direct correlation with the energy consumption.
- Employment Rate has a significant direct correlation with the energy consumption.

Test of assumptions accuracy and significant model (residual term reliability): After estimating the model, the accuracy of estimated coefficients and results should be ensured through the econometric and regression tests. About this model, doing several tests, which their most important one is the residual term reliability test, is essential. As mentioned in the reliability section, all study variables were not stable at the level, so the co-integration of obtained relationship should be ensured in order to meet the accuracy of regression results and this important issue can be achieved through the test of residual term reliability. However, the test of residual term co-integration or reliability is one of two real regression tests; the second and other test is Durbin-Watson Test of co-integration regression. Results of this test are presented in Table 7.

Given the value of Dickey-Fuller statistic for the residual term is lower than the critical value, it can be concluded that the residual term or model error is stable at all levels and the estimation is co-integrated and the regression is real.

CONCLUSION

Results of Pearson Correlation coefficient test confirmed the hypotheses about the significant correlation between the independent variables with the energy consumption. Therefore, the hypotheses H_{01} (GDP with coefficient 0.017), H_{02} (Inflation with coefficient 0.050), H_{03} (Economic growth with coefficient 0.024) and H_{04} (Employment with coefficient 0.02) are confirmed.

Evaluation of stability (durability or reliability) of variables by E Views software has indicated that except for the variables GDP, CPI and EG, which are stable in the first order difference, the other variables are stable at the level. Thus, the final result of durability tests indicate that the research variables become stable either

in the first order difference or at the level, thus the target patterns can be fitted by determining the degree of variables durability and no problem will be made for the models in this regard. Estimation of model coefficients and the variables by the least squares technique and E Views software is as follows:

$$\theta = 2345682 + 0.0061\ GDP + 0.0048\ CPI + 0.0009\ EG + 0.0012\ L$$

Statistic t indicates that all four research hypotheses are confirmed. In other words, the research results show that:

- Variable coefficient of Gross Domestic Product indicates a positive, significant and strong correlation with the Energy Consumption. So that by one unit increase in GDP the domestic Energy Consumption rate was increased equal to as 0.0061 unit.
- Estimated results and coefficients of variables indicate that the inflation or the Consumer Price Index (CPI) of goods and services has a positive, significant and strong correlation with the energy consumption, so that by one unit increase in the inflation, the energy consumption in various economic sectors will be increased equal to 0.0048. One of the reasons of this issue is that by increasing the inflation, the cost of energy consumption is increased and in the current conditions the cost of goods and services is increased directly by cutting the subsidy in the industrial sector.
- Coefficient of economic growth variable indicates a positive, significant and strong correlation with the energy consumption. So that by one unit increase in the GE the domestic energy consumption will be increased equal to 0.0009 units. In fact, the GDP will be increased if the domestic production is increased by enhanced employment and number of employees as well as the capital in different economic parts of country.
- The employment rate also has a direct and significant correlation with the energy consumption; so that by one unit increase in employment rate, the energy consumption will be increased equal to 0.0012 units. By increasing the employment rate the firms and corporations must increase their own production and income limit and then the energy consumption rate will be increased. This increase along with the inflation factor of consumer price index by the government will indicate the increased rate of energy consumption in the consumer price index of goods and services.

Moreover, R^2 statistic indicates that 89% of changes in dependent variable (Energy Consumption) can be explained by the explanatory variables of the model and this suggests the high explanatory power of model; and high F statistic of the model (114.36) indicates the overall significance of regression. Furthermore, Durbin-Watson Statistic in the model equal to 1.96 rejects the hypothesis of self-correlation between the components of model.

Given that the Dickey-Fuller unit statistic of residual term is lower than the critical value in the accuracy detection and model significance test, it can be concluded that the residual term or the model error at all levels is durable, the estimation is co-integrated and the regression is real.

RECOMMENDATIONS

Since the results of this survey which indicates the dependence of energy consumption on GDP, CPI, EG and the employment rate, any governmental policy in relation to increased Gross Domestic Product, Economic growth and employment rate leads to increased rate of energy consumption and subsequently increased CPI index. Due to this dependence cycle, the CPI index on household consumption basket is recommended for reducing the negative effect of inflation:

- It is better to continue the anti-inflationary policies to increase the Gross Domestic Product and go towards the increased "Number instead of price" of real product and neutralize the inflationary effect of prices in the mentioned index by specific policies. For instance, in the tax section the reduced tax limit policies for encouraging lower cost of services and increased demand elasticity of services (particularly the public services) can be considered in Value Added Tax (VAT) plan.
- In addition to the payment of cash subsidies to people by the government, it would be better if in the section of paying the consumption tax on consumed goods and services (Value Added Tax) the government provided the facilities for the vulnerable groups according to the current conditions and facilities.
- Employment policies have a long term and increasing effect on the Gross Domestic Product and the elasticity of consumer goods and services. Effects of this increase are more beneficial than reducing the employment policies to reduce the energy consumption rate. In this sector, it is better to ignore the policies to increase the consumption of energy factors.

Suggestions for other researchers:

- Researchers can use more tests including the normally distributed errors test (Residuals), collinearity hypothesis, White test for detection of variance dissimilarity, estimated LM test for detecting the successive dissimilarity of residual and estimated Ramsey test, in order to obtain more assurance and accuracy about the significant tests in the future studies.

- Determining other factors affecting the increased energy consumption in the way of future research based on the Durbin-Watson test according to neutralizing the inflationary effect on the consumption price of energy carriers.
- Determining the energy consumption function of country based on the effective macroeconomic indicators by using the Stepwise regression statistics as the final function.

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