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INVESTIGATING THE EFFECT OF DUTCH DISEASE ON THE PROCESS OF EMPLOYMENT IN IRAN

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ABSTRACT

The significance of oil incomes in the economy of Iran is an undeniable issue. Not only has the oil sector as one of the important economic activities influenced other economic variables, but also incomes earned from this sector as an important financial resources in Iranian economy has significant role. In this line, the Dutch Disease as an economic concept tries to explain the relationship between excessive utilization of natural resources and recession in the industry. The present study is to investigate the effect of the Dutch Disease on the process of employment in Iran during 1973 to 2013 using Johansson-Joselius method.

The results of the present study indicate that there is a reverse correlation between the increase in oil incomes (as a sign of the Dutch Disease) and employment in Iran. In fact, in the first period, the highest variations of employment was due to variations related to the variable itself. But, in the next periods, employment depends on variations of the variable of employment itself, real GDP, Variable of the tradable sector to the non-exchangeable one and the variable of oil price.

Keywords: Dutch Disease, Oil Price, Employment

INTRODUCTION

Until 19th century, what was mostly discussed about the economy of European countries was real estates. But, gradually and after the Industrial Revolution in Europe, natural resources attracted the attention of economists. In 20th century and particularly after World War II, planners found out that every kind of economic growth was possible only by accessing natural resources **[4]**. Accordingly, exhaustible resources are those

whose supply decreases when they are used more such as oil, natural gas, coil, mineral stones. By increasing utilization of exhaustible resources, gradually owners of this resources decreases and the less the number of these owners, the more possible the remaining countries to construct a Cartel.This event occurred in 1960 in relation with crude oil by OPEC when industrial countries faced challenges forcheap domestic production of crude oil. This oil Cartel could lead the oil shock in 1973 **[14]**.

Theoretical framework and review of literature

The significance of oil income in the economy in Iran is an undeniable issue. Not only has the oil sector as one of the important economic activities influenced other economic variables, but also incomes earned from this sector as an important financial resources in Iranian economy has significant role. These incomes supply a large part of foreign exchange resources and significant part of the government incomes. Regarding the dominant role of the government in the economy of these countries, oil incomes determine the degree of economic growth, consumption, national savings, investment, exchange rates, inflation rates, etc. in fact, fluctuations in oil incomes result in economic and social fluctuations in these countries. In other words, economic and political crises in the global market are rapidly transferred to oil countries via fluctuations of oil prices **[7]**.

In this line, the Dutch Disease is an economic concept which tries to explain a relationship between excessive utilization of natural resources and the slowdown in the industrial sector. This concept states that the increase in the income obtained from natural resources can save the national economy from the industrial state. This event occurs due to the increase in the foreign exchange rates or the lack of increase in it to the extent of inflation rates which can weaken the industry sector in a competition. The term Dutch Disease was coined in 1977 by Economist for describing the stagnation of the industrial sector in the Netherlands after exploration of natural gas in 1960's **[11]**. In 1959, in Netherlands, significant natural gas resources were explored and this exploration expanded rapidly in the beginning of 1960's and the country earned huge and sudden foreign exchange reserves. Instead, the economy of this country suffered from the increase in inflation rates, decrease in manufactured exports, lower growth in income growth and rising unemployment rates because this phenomenon caused that workforces and facilities of production transferred from industrial sectors to sectors such as

administrative services and building construction. Therefore, after 1977, such a phenomenon is called the Dutch Disease **[9]**.

The following consequences can be considered for the Dutch Disease:

1. Reduction in the incentive to develop other sections related to natural resources
2. Reduction in the amount of savings and investment
3. High variability of revenues obtained from natural resources and its impact on economic growth

To investigate the effects of the Dutch Disease, economy can be categorized in three sections; a flourishing section (such as oil section) whose all production is exported, industrial and productive section, and the section of producing non-tradable goods at the international level. As a result, we are faced with two sections including tradable goods and a section including non-tradable goods. In the export section, there appears flourishing, the primary effects in this section is the increase in incomes which results in the increase in domestic demands for tradable and non-tradable goods. This issue causes that resources transfer from tradable goods to non-tradable ones. The increase in the prices of non-tradable goods results in the increase in the value and loss of competitiveness of real rates of foreign exchanges **[13, 8]**. In addition, this issue lowers the relative price of import goods while increases export prices for foreign consumers. This issue intensifies the transfer of productive resources and domestic demands from productive section to the non-tradable section because resources such as capitals and jobs are necessary for realization of the increase of domestic demands are transferred to the production section of domestic non-tradable goods and also to the oil section for growth. Both of these transferences decrease the degree of production in the section of traditional exportation which now it has been stopped, and result in the processes which is known as De-industrialization in the economy of industrial countries **[1]**.

Nasrollahi et al. (2009), investigated the Dutch Disease in the economy of Iran during 1971-2007 with the influence of the exchange relationships on investment using co-integration techniques. To obtain this aim, firstly, the investment function was explained based on the conventional theories of investment and by considering the mechanism of influence of exchange relationships on the investment. The results of the research indicated the confirmation of

the existence of the Dutch Disease in the economy of Iran.

Dargahi (2008) investigated the relationship of economic growth with the abundance of natural resources in the economy of Iran using the method of simultaneous equations. The results of the research indicated that the reduction of competitiveness in the economy of Iran is in the era of oil boom which significantly influences the amount and combination of exports and imports. In other words, the economy of Iran suffers from the Dutch Disease.

Bekhet and Yusop (2009) investigated the relationship of prices of oil, energy consumption, and performance of macro-economy of Malaysia using the Cointegration approach and Error Correction Model. The results of the study indicated that there is a long-term relationship between oil prices, employment, economic growth, and energy consumption rate in Malaysia.

Aden and Karnstrom (2009), investigated the relationship of oil and the Dutch Disease in the United Arab Emirates using the OLS method during 1975-2005. The results indicated that the signs of the Dutch Disease in the UAE is obvious in such a way that this diseases causes inflation in this country.

Lartey, Madelman and Acosta (2008), during 1990-2003, conducted as series of studies on the effects of the Dutch Disease on the employment rate of 209 developing countries using the Panel Data method. The results of the research indicated that the increase in the oil incomes in the developing countries have negative effects on the productive and industrial sectors, while non-tradable section in the economy grows and results in inflation.

METHODOLOGY

Regarding the theoretical framework and experiential research particularly that of Lartey, Madelman and Acosta (2008), the research model can be presented as follows:

$$Emp = f(Cpi, Poil, Rgdp, Rval)$$

Or it can be presented in the form of a model of Econometrics as follows:

$$Emp = \beta_1 + \beta_2 Cpi_t + \beta_3 Poil_t + \beta_4 Rgdp + \beta_5 Rval_t + \varepsilon_t$$

Where the variables of the model can be defined as follows for the period from 1973-2013:

Emp: employment rate

Cpi: Price index

Poil: oil price in global markets

Rgdp: Real gross domestic product

Rval: the ratio of tradable section to non-tradable section

In the present study, to estimate the model, Johansson-Joselius convergent method was used. In this method, firstly the reliability of the variables of the model is investigated and

then, the VAR of the model is determined using the SBC test. In the next stage, after determining the number of convergence vectors, the optimal vectors appropriate for economic theories were selected and accordingly, Vector Error Correction Model was estimated.

Table 1: Augmented Dickey-Fuller test and Phillips – Perron test

Variable	Augmented Dickey–Fuller test (ADF)		Phillips – Perron (PP) test	
	At level and with the intercept and temporal process	The difference and the intercept	At level and with the intercept and temporal process	The difference and the intercept
lnEmp	-4.37	-4.18	-1.37	-5.96
Critical value at 0.05	-3.56	-2.96	-3.52	-2.93
lnCpi	-2.24	-3.81	-2.13	-4.07
Critical value at 0.05	-3.52	-2.94	-3.52	-2.93
lnPoil	-2.98	-5.77	-2.89	-5.99
Critical value at 0.05	-3.52	-2.93	-3.52	-2.93
lnRgdp	-2.19	-7.68	-1.98	-7.36
Critical value at 0.05	-3.52	-2.93	-3.52	-2.93
Rval	-2.61	-8.15	-2.81	-9.20
Critical value at 0.05	-3.52	-2.93	-3.52	-2.93

Resources: research calculations

Estimating research model

In the first stage, it is necessary that the VAR can be determined using the criteria for determining lag. Determining the optimal lag should be don based on variables of the model and the sample size. Regarding the fact that the sample size in this study is equal 40 observations and less than 100, to determine the optimal lag, the Schwartz - Bayesian criterion was used, however the results of other criteria is equal to the results of the Schwartz - Bayesian criterion. The results of determining optimal lag for variables of the model are presented in tables 2and 3.

Regarding the results of table 2, it can be said that the optimal lag of the VAR model is one according to the Schwartz – Bayesian determining lag criterion.

In the next stage, to estimate the long-term relationship between the variables of the model and determining the number of convergence vectors, a number of convergence vectors should be determined between the variables of the model using the statistics of the effect matrix test and the

maximum of eigenvalues. The results of these tests are presented in tables 3 and 4.

Regarding the results of table 6, it can be said that the speed of modification of short-term errors towards the long-run equilibrium was -0.00067 and is not significant, which indicates the low and insignificant speed towards the long-run equilibrium. It means that the short-term modification towards a long-term relationship is very difficult and it is conducted in very low speed.

Table 2: determining the number of optimal lags in the VAR model

Number of lags	The value of the Schwartz - Bayesian criterion
0	-6.57
1	* -13.70
2	-12.29
3	-11.77
4	-11.17
5	-10.19

Resources: research calculations

Table 3: test of the maximum of eigenvalues (λ max)

Probability value (Prob.)	Critical value at 0.05	The value of the test	Alternative hypothesis	Null hypothesis
0.03	24.15	25.41	r=1	r=0*
0.56	17.79	9.27	r=2	r=1
0.16	4.12	2.15	r=3	r=2

Resources: research calculations; *It is the indicator of rejecting the null hypothesis and the existence of a convergence vector at sig.=0.05.

Table 4: test of effect matrix ($\lambda trace$)

Probability value at 95%	Critical value at 95%	Test statistics	Alternativ e hypothesis	Null hypothesis
0.02	40.17	43.81	r=1	r=0*
0.23	24.27	18.40	r=2	r=1
0.17	4.12	2.15	r=3	r=2

Resources: research calculations

***It is the indicator of rejecting the null hypothesis and the existence of a convergence vector at sig.=0.05.**

Table 5: estimating the convergence vector

t-student value**	SD	Coefficient	Variable name
-------	-----	1	lnEmp*
-3.40	0.08	-0.27	lnPoil
11.85	0.17	2.03	lnRgdp
2.02	0.60	1.21	Rval

Resources: research calculations

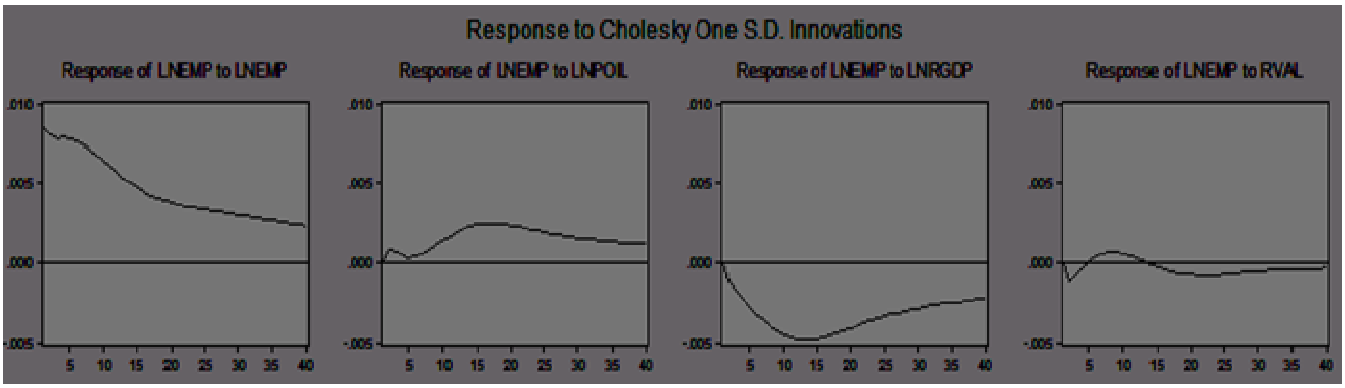
***the convergence vector is normalized in comparison with the variable lnEmp.**

****regarding the fact that the Johansson-Joselius convergent method cannot indicates the values of probability, therefore, for the significance of the coefficients of the explanatory variables, t-student test was used.**

Table 6: estimating the VECM model

The value of t-student test	SD	Coeffici ent	Variable
-----	------	-----	$\Delta \ln Emp_t$
-0.09	**0.0068**	**-.00067**	**ecm (-1)**

Resources: research calculations



Graph 1: functions ofimmediate responses to shocks in 40 periods of time (IRF)

Table 7: the results of variance analysis for employment in 10 periods of time

Period	The share of employment shock %	The share of real GDP shock %	The share of the ratio tradable sectors to non –trade one shock %	The share of the oil price shock%
1	**100**	**0**	**0**	**0**
2	**72**	**9**	**12**	**7**
3	**72**	**15**	**6**	**7**
4	**71**	**20**	**3**	**6**
5	**70**	**24**	**0.2**	**5.8**
6	**64**	**29**	**2**	**5**
7	**60**	**28**	**3**	**9**
8	**55**	**29**	**4**	**12**
9	**52**	**30**	**4**	**14**
10	**49**	**32**	**3**	**16**

Resources: research calculations

The results obtained from the variance analysis of the variable of employment in table 7 indicate that in the first period, most of variations of employment is due to the variations of the variable itself. But, in next periods, variations of employment depends variation of the variable of employment itself, real gross domestic product, the variable proportion of tradable to non-tradable goods and variable oil prices. Regarding employment, the results of obtained from variance analysis in table 7, it is indicated that in the first period, 100% and in the second period, 72% of variations are related to the variable itself and the rest is related to other variables. Om the first period, employment is not influenced by the gross domestic product. In the second period, 9% of the variations of employment are related to the GDP, in the third period, 15% of and

gradually the value is increasing. In long-term periods (the tenth period), the DP explains about 32% of the variations of employment.

CONCLUSION

The results of the immediate response or reaction functions indicate that a shock as magnitude as an SD in the variable of oil price in the first period does not cause the decrease in the degree of employment, but in the second and third periods, it causes % decrease in the employment. Since the fourth period, this trend increases in such a way that in a long-term period (the tenth period), this value reaches 16%. In other words, shocks due to variations of oil prices causes the decrease in the employment level in Iran.

At last, regarding the results of testing hypothesis, the theoretical framework and reviewing the literature, it can concluded that the increase in the oil price as an indicator of the Dutch Disease in the economy of Iran results in the entrance of oil dollars into the economy and causes the increase in the inflation and the decrease in the production of the productive sector of economy. In addition, by decrease the production level, the level of employment decreases as well.

Political suggestions

1. The results indicate that to access a high level of employment, the decrease in the function of oil in the economy of Iran is required because by decreasing the effect of oil dollars in the economy, an endogenous production section is created and results in more employment degree in Iran. Therefore, the government should be small and adroit to provide the grounds of business and make the economy of Iran more efficient.
2. Paying more attention to the agricultural and industrial sectors than to the sector of services causes the increase in production and employment in Iran. Therefore, policy making in the government should improve the space of business in the industrial and agricultural sectors.

Suggestions for further research

1. Researchers can use other indicators of the Dutch Disease such as the amount of oil incomes.
2. To find realer results, it is suggested that the researchers should investigate the effect of the Dutch Disease in terms of economic sub-sections such as industry, agriculture, etc.
3. In case of access to information, researchers can increase the periods of their studies and to estimate the

model, they can use other econometric approaches for estimation of the model.

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