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The Effects of Oil Prices and Oil Production on Non-Oil Exports in an Oil-Rich Country: The Case of Dutch Disease Symptom in Azerbaijan

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ABSTRACT

The aim of the study is to examine whether there is a Dutch disease symptom by revealing the short-term and long-term effects of oil prices and oil production on non-oil exports in oil-rich Azerbaijan. In this context, autoregressive distributed lag model bounds test and fully modified ordinary least squared method was applied by considering oil price, real gross domestic product and non-oil real export variables covering the period 2001Q1 and 2019Q4. The results of the analysis figure out that there is a cointegration relationship between the variables. Short-term and long-term coefficients are statistically indicated. In the long run, there is a positive relationship between non-oil real exports and oil prices, but a negative relationship between non-oil real exports and oil production. Especially the second finding can be associated with "resource movement effects," which is one of the symptoms of Dutch disease. The research can be described as original because it evaluates the Dutch disease phenomenon from the perspective of oil (abundant resource) production and because there are almost no similar studies in the literature in terms of examining the effect of oil production on non-oil exports in general. In addition, there is no common opinion in the literature about the presence of Dutch disease in Azerbaijan, in this context, results of this research, which offer a unique perspective to test the presence of Dutch disease, provide valuable information.

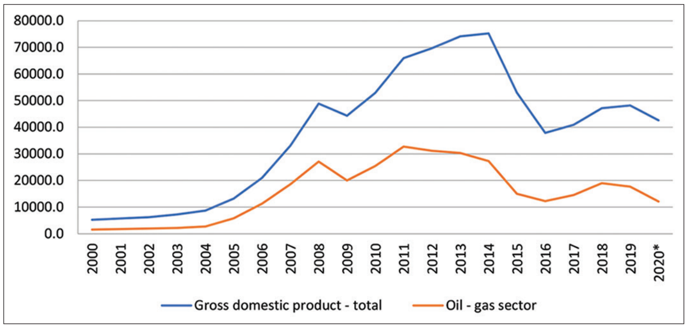
Keywords: Oil Production, Non-Oil Export, Dutch Disease, Oil Prices, Autoregressive Distributed Lag Model Bound Test, Fully Modified Ordinary Least Squared Method, Azerbaijan, Oil-Rich Country
JEL Classifications: C22, F14, L81, Q43

1. INTRODUCTION

Azerbaijan, which gained its independence since 1991 with the collapse of the Soviet Union, is known as one of the oil-rich countries. When we examine the country's economy, it is seen that a development period has started with the increase in oil production, especially since 2005 - the year when the Baku-Tbilisi-Ceyhan belt was put into use (Figure 1). Since 2000, Azerbaijan shows its total gross domestic product (GDP) and GDP by oil and natural gas sector. The graphical representation of the data reveals once again that the Azerbaijani economy is dependent on the energy sector. That is to say, almost the same fluctuations in the oil and natural gas sector are on the line reflecting the GDP. Moreover, the oil price data reflected in Figure 2 explains the reasons for these fluctuations. Namely, the Azerbaijan economy, which started to generate revenues from oil with the realization of the Baku-Tbilisi-Ceyhan project, was immortally affected by the decline in oil prices in 2008 as a result of the financial crisis and in 2015. Especially after 2015, the country's currency, the manat, devaluated and because of the fluctuations in the exchange rate that continued for about 1.5 years, 1 dollar was valued around 2.2.

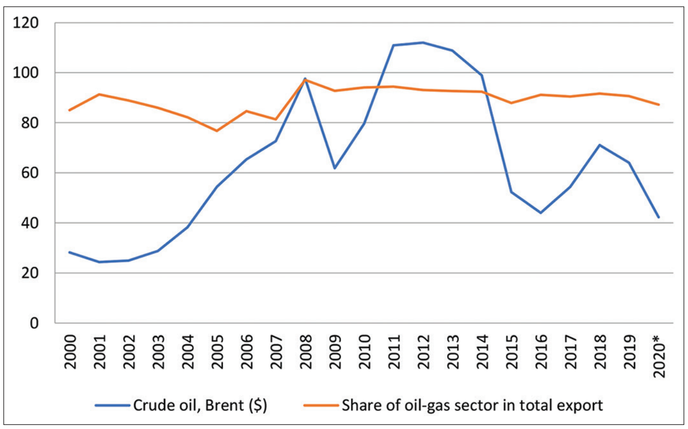
Moreover, the data obtained from the Azerbaijan State Statistics Committee in Figure 2. indicate that the energy sector is of immense importance in the total exports of Azerbaijan. Namely, since 2000, the share of the oil and natural gas sector in total exports has been over 80%, and in 2008 it reached the maximum level and constituted 97.1% of total exports. With the decrease

Figure 1: Total gross domestic product (GDP) and GDP by Oil-Gas Sector (mln. dollar)



Source: System of National Accounts and Balance of Payments, The State Statistical Committee of the Republic of Azerbaijan, https://www.stat.gov.az

Figure 2: Crude oil price and the share of oil and natural gas sector in total exports



Source: World Bank Commodity Price Data, https://www.worldbank.org, Macroeconomic Indicators, Central Bank of The Republic Of Azerbaijan, https://www.cbar.az

in oil prices since the end of 2014 and the beginning of 2015, the country's economy entered a period of recession. To understand the structure of the Azerbaijani economy and make a general assessment, an analysis from the perspective of the Dutch disease can be used. Gahramanov and Fan (2002), Bayramov and Conway (2010), Gurbanov (2011), Hasanov (2013), Niftiyev (2020), Niftiyev (2021)and many other researchers approached from this perspective and evaluated the economy of Azerbaijan.

The government of Azerbaijan, especially after the recession since 2015, perceived these symptoms as a serious threat and started to implement new economic policies to reduce the dependence of the country's economy on the oil sector. In this context, it is possible to give an example of the strategy roadmaps regarding the National Economy and the main sectors of the economy adopted in 2016 (2016). A total of 12 strategy roadmaps were accepted, and the main target stated in almost all strategy roadmaps is the development of the non-oil sector.

The main purpose of this study is to make an evaluation of the export performance of the petroleum sector, especially from the perspective of the Dutch disease, and to test whether there are symptoms of the Dutch disease in this framework. In this context, firstly, the literature on the studies on the Dutch disease were investigated and especially the studies on the Azerbaijan economy were examined in detail. Unlike other studies, this research examines the effects of oil prices and production in the oil and natural gas sector on the non-oil export. In this study, which was conducted by considering the quarterly data between 2000Q1 and 2019Q4 time frame, autoregressive distributed lag model (ARDL) bounds test was applied to test the short-term and long-term relationship.

2. LITERATURE REVIEW

The term Dutch disease, which was used for the first time in the literature in the Journal of The Economist published in 1977 (Ojaghlou, 2019), was theoretically first discussed by Corden and Neary (1982) and Corden (1984) and evaluated through the "basic or core model of Dutch disease." Corden and Neary (1982) divide economies into three different sectors. These are the booming sector (oil sector in the scope of this research), the tradable sector and the non-tradable sector (service sector). The basic hypothesis of the researchers is that if the booming sector causes development in the non-tradable sector, and if there is a decrease in demand or a decrease in production in the tradable sector, it shows the Dutch disease. In this disease process, two important effects, expenditure, and resource movement, come to the fore.

The expenditure effect reflects the increase in total expenditures and total demand as a result of the rapid increase in the exports of natural resources and the increase in income, as well as the increase in both state budget revenues and National Income (Pegg, 2010). The effect of the movement of resources reflects the transition of production factors such as labor and capital from the tradable sector to either the booming sector (direct) or the non-tradable sector (indirect), which ultimately leads to direct or indirect de-industrialization (Hasanov, 2013) (Corden, 1984) (Poncela et al., 2017).

When the literature is examined, there are numerous studies on the symptoms of Dutch disease, especially in oil-rich countries. These studies have tried to detect these symptoms by considering different economic indicators and applying different econometric models. Table 1 summarizes the methods and results of various studies conducted within the scope of Dutch disease.

As stated in the introduction, the Dutch disease phenomenon is also important for the economy of Azerbaijan. In this context, a summary of the methods and results of assorted studies examining the Azerbaijan economy is given in Table 2.

Based on the summary of the studies in Table 1, it is possible to say that most studies on resource-rich countries conclude that statistical evidence has been found for the Dutch disease phenomenon. The most often used independent variables in research are real effective exchange rate, economic growth, real GDP, export data, and dependent variables are data such as oil

Table 1: Summary of research on the dutch disease phenomenon

Authors	Economy and period covered by the study	Variables	Method	Conclusion
Bruno and Sachs, 1982	England, 1973	Oil price, exchange rate, GDP; consumption, investment	Time series analysis, dynamic simulation	Dutch disease has been statistically confirmed
Fardmanesh, 1991	Algeria, Ecuador, Indonesia, Nigeria and Venezuela	Oil price, productivity, real exchange rate	Panel data analysis	Dutch disease has been statistically confirmed
Paldam, 1997	Denmark	Economic growth, exchange rate, foreign trade, GDP	Time series analysis	Dutch disease has been statistically confirmed
Oomes and Kalcheva, 2007	Russia, 1995–2005	REER, oil price, government spending, productivity differential, net international reserves, industrial production, foreign demand, corruption	Time series analysis	Oil and REER parallelism; This was reflected as a decline in industry and growth in services
Goda and Torres, 2013	Colombia	Relative productivity, relative government consumption, interest rate differentials, commodity prices, net trade balance, financial net inflows, changes in foreign reserves	Time series analysis, F Test and Quandt-Andrews Breakpoint Test	The Explosion in Capital Inflows Evaluated Colombia's REER
Mironov and Petronevich, 2015	Russia, 1997–2013	REER, oil price, physical volume of exported oil, government expenditures as a share of GDP, net international reserves	Time series analysis, Cointegration Analysis between Export Revenues and REER	A 1% increase in export revenues evaluates the REER by 0.2%
Barczikay et al., 2020	Bostwana, 2006–2018	Real and nominal exchange rates, domestic and trade partner inflation rate	Panel data analysis	The partial Dutch disease phenomenon has been found through Botswana's economic relations with trading partners such as Namibia and South Africa
Oludimu and Alola, 2021	Nigeria, 1980–2018	Crude oil production, square of crude oil production, crude oil reserves, population, export of goods and services, manufacturing value-added	Time series analysis, ARDL, FMOLS and CCR	Dutch disease has been statistically confirmed

REER: Real effective exchange rate, GDP: Gross domestic product, ARDL: Autoregressive distributed lag model, FMOLS: Fully modified ordinary least squared, CCR: Canonical cointegrating regression

price and inflation rates. Among the studies summarized in both tables, only Oludimu and Alola (2021) took oil production into account. According to the results of the research, a 1% increase in oil production causes a 15.08% decrease in the Nigerian economy according to the FMOLS approach and 15.21% according to the CCR approach. In addition, it was statistically determined that the increase in oil production caused a decrease in production in the manufacturing industry.

Studies on the existence of Dutch disease related to Azerbaijan do not reach a common result. Namely, Şanlisoy and Ekinci (2019) Gahramanov and Fan (2002), Bayramov and Conway (2010), Gurbanov (2011) and Gasimov (2014) statistically determined that there are no symptoms of Dutch disease in the Azerbaijan economy, although Hasanov (2010), Hasanov (2013), Niftiyev (2020) and Niftiyev (2021) have obtained findings that Dutch disease exists. As a result, the existence of Dutch disease in the economy of Azerbaijan is a controversial issue.

2.1. Data, Variables and Methodology

The subject of the study is to examine the short-term and long-term effects of oil prices (OIL) and the real GDP (PROIL) by the oil sector on the non-oil real export (EX) to order to detect the symptoms of the Dutch disease in the Azerbaijan economy. Data on oil prices are taken from World Bank Commodity Price Data. Non-oil real export data were obtained by converting the nominal values obtained from the statistical reports published by the Central Bank of Azerbaijan into real values by the GDP deflator (2005 base year) obtained from the reports published by the State Statistical Committee of The Republic of Azerbaijan. Real GDP data on the oil sector (2005 base year) includes the data on the oil and natural gas sector in the report of the Real GDP according to the sectors published by the State Statistical Committee. Quarterly data from 2001Q1 to 2019Q4 were used in the analysis, with a total of 76 observations. The created econometric model was analyzed with the help of Eviews and STATA programs.

When starting analyzes on selected data, the Tramo/Seat method was initially used to test for seasonality. Since there is a seasonality factor, the analysis was continued by considering the seasonally adjusted data. In the next step, trend analysis was performed, and it was determined that there was a trend in all three variables. Natural logarithms were taken, considering the size difference between the data. Rough graphs of logarithmic data are given in Figure 3.

After taking the logarithm of the data, Augmented Dickey-Fuller (ADF) (1979), Phillips and Perron (PP) (1988) and KPSS

Table 2: Summary of research on the Dutch disease phenomenon in Azerbaijan

Authors	Variables	Method and period of the study	Conclusion
Gahramanov and Fan, 2002	Real exchange rate, domestic prices, real wages, terms of trade	Time series analysis, 1997–2001	Dutch disease has not been statistically confirmed
Bayramov and Conway, 2010		Quantitative research (survey)	Dutch disease has not been statistically confirmed
Hasanov, 2010	REER, domestic consumer price index, domestic producer price index, trade-weighted average consumer price index of main trading partners, trade-weighted average producer price indices of main trading partners, manat-US Dollar bilateral exchange rate and nominal oil price	Time series analysis, VAR model, 2000Q1-2007Q4	Dutch disease has been statistically confirmed
Gurbanov, 2011	Monthly budget expenditures, non-oil GDP, non-oil industrial sector, agriculture and construction for non-tradable sectors, transport, communication, services, commerce, hotels, and restaurants; increases in oil prices as an independent variable	Time series analysis, 2002–2008	Dutch disease has not been statistically confirmed
Hasanov, 2013	GDP growth, growth by sectors, REER, government expenditure, government investments, real wage growth, oil price	Time series analysis, 2000–2007	Dutch disease has been statistically confirmed
Gasimov, 2014	Real GDP, crude oil export, real exchange rate and manufacturing output	Time series analysis, VAR model, 2000–2010	Dutch disease has not been statistically confirmed
Sanlisoy and Ekinci, 2019	Crude Oil Price (Brent Type), Real Gross Domestic Product	Time series analysis, NARDL test, 2001Q1 – 2018Q2	Dutch disease has not been statistically confirmed
Niftiyev, 2020	GDP, employment, trade and production statistics by booming, tradable and non-tradable sectors	Time series analysis, descriptive statistics	Dutch disease can be observed in the Azerbaijan economy
Niftiyev, 2021	Oil price growth rates, REER, NEER, and economic crisis periods	Time series analysis, ordinary least squares, 2000Q1-2018Q4	Dutch disease has been statistically confirmed

NEER: Nominal effective exchange rate, REER: Real effective exchange rate, GDP: Gross domestic product, ARDL: Autoregressive distributed lag model, NARDL: Nonlinear Autoregressive Distributed Lag, VAR: Vector Autoregressive

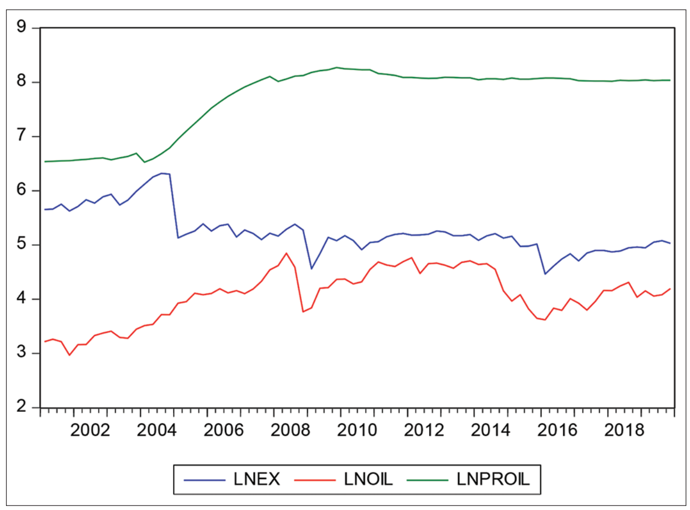
Table 3: Descriptive statistics

	EX (mln \$)	OIL (\$)	PROIL (mln azn)
Mean	208.9605	64.64737	2582.096
Median	176.0000	61.09000	2601.800
Maximum	616.0000	131.5200	4803.200
Minimum	72.00000	18.52000	563.3000
SD	106.4226	28.01183	1234.769
Skewness	1.801432	0.329850	−0.241154
Kurtosis	6.546713	2.132441	1.926216
Jarque-Bera	80.93936	3.761563	4.387839
Probability	0.000000	0.152471	0.111479
Observations	76	76	76

(Kwiatkowski et al., 1992) unit root tests were applied to test the stationarity. Zivot and Andrews (1992) test was applied to test for structural breaks in the data. According to the test results, it was concluded that there was a structural break in the data of the independent variable LNEX and the dependent variable LNPROIL in the 2005Q1 period.

After drawing the descriptive framework for the data (Table 3) and unit root tests (Table 4), the ARDL model was established, and the results were interpreted. It has been analyzed whether there is a long-run cointegration relationship between non-oil exports and oil prices and oil production variables. The cointegration relationship was tested by using the "ARDL bounds test approach" proposed by Pesaran and Shin in 1997 and developed by Pesaran et al. (2001).

Figure 3: Raw graphical data of variables



In cointegration analysis, there are econometric methods developed to reveal long-term and short-term effects. The most widely used among these are the Engle and Granger (1987) test, Johansen (1991) and Johansen and Juselius (1990). ARDL model is a common analysis used in time series analysis. ARDL provides a platform to explain the relationship between macroeconomic or financial variables in a dynamic model. ARDL captures the dynamism in the model by providing the best platform for estimating the multiplier effects of covariates and good estimation

Table 4: Unit root tests

Variable	ADF		PP		KPSS	
	Level	First difference	Level	First difference	Level	First difference
LNEX	−3.480173**	−9.362035***	−3.533852**	−10.78298***	0.134784*	0.076371
LNOIL	−1.906566	−7.866389***	−1.892470	−7.916484***	0.249003***	0.061733
LNPROIL	−1.482544	−3.093877	−0.869019	−5.104688***	0.265567***	0.093639
1% level	−4.085092	−4.086877	−4.085092	−4.086877	0.216000	
5% level	−3.470851	−3.471693	−3.470851	−3.471693	0.146000	
10% level	−3.162458	−3.162948	−3.162458	−3.162948	0.119000	

Constant + trend model is used. Maximum number of lags is 11 and choosing maximum lag criteria is SCH. Using Bartlett kernel spectral estimation method for PP and KPSS test and Bandwidth method is Newey-West. *10% significance level, **5% significance level, ***1% significance level. ADF: Augmented dickey fuller, PP: Phillips and Perron, KPSS: Kwiatkowski, Phillips, Schmidt and Shin

techniques in time series (Gujarati, 2015). ARDL approach is preferred mainly because of its two features. First, [I (0) and I (1)] ARDL can be applied even if the variables have different order of integration. This feature provided by the model has made the ARDL model popular among researchers. The second advantage of using the ARDL approach is that it allows sufficient delays to capture the data generation process in the general-to-specific modeling framework (Pesaran and Pesaran, 1997).

In general, the ARDL model is a linear time series model in which both dependent and independent variables have a relationship in which their lagged values and level values are integrated. ARDL examines the relationship between non-stationary series and provides a reparametrized version of the model to obtain an error correction model.

After obtaining the result that there is cointegration with the ARDL bounds test, the FMOLS method developed by Phillips and Hansen (1990) is used to reveal the coefficient of the long-term relationship between the variables. FMOLS is known as a further developed version of the Ordinary Least Squares (OLS) method. The general form of the regression model created by this method is as follows:

$$LNEX = \beta 0 + \beta 1\ LNOIL + \beta 2\ LNPROIL + \varepsilon t \quad (1)$$

where εt denotes an error term and β0 denotes to the intercept. LNEX is dependent, LNOIL and LNPROIL are independent variables.

3. RESULTS

The results of the descriptive information and distribution tests performed on the variables are summarized in Table 3. The average value of non-oil real exports during the specified period was 209 million dollars. The maximum and minimum values for this indicator were 616 and 72 million dollars, respectively, during the period specified. Oil prices, on the other hand, hovered around 64.6 dollars on average. The peak point of oil prices was 131.5 dollars, and the lowest value was 18.5 dollars. When we consider the real GDP by the oil and natural gas sector, it has been determined that the maximum value is 4.8 billion dollars, the minimum value is 563 million dollars, and the average value is 2.6 billion dollars. Moreover, the Jarque-Bera test reveals that the OIL and PROIL data are normally distributed, but the EX data are not normally distributed.

One of the absolute conditions required for the data to be analyzed within the econometric model is that it is stationary or that it does not contain a unit root. Because if the data is not stationary, the interpretations resulting from the t-statistic will not be valid. The data do not need to be stationary at the same level to apply the ARDL bounds test. But the point to be noted here is that the data are not stationary at second differences. That is, the data must be stationary at either the I(0) or I(1) level.

The stationarities of the variables in the study were tested using ADF (1979), PP (1988) and KPSS (Kwiatkowski et al., 1992) unit root tests. According to both ADF and PP test results, LNEX was found to be stationary at 5% significance level at I(0) and LNOIL at 1% significance level at I(1) level. The LNPROIL variable, on the other hand, was found to be non-stationary at I(0) and I(1) levels according to the ADF results. The PP test, on the other hand, reveals that the LNPROIL variable is stationary at the I(1) level. For this reason, the KPSS test, which is a different unit root test, was applied, which shows that the LNPROIL variable is stationary at the I(1) level, not at the I(0) level. As a result, based on the PP test results, the analyzes were continued considering that LNEX I(0), LNOIL I(1), LNPROIL I(1).

ADF, PP and KPSS unit root tests used to test stationarity in the study are tests that do not consider the possibility of structural break in time series. For this reason, in addition to ADF and PP unit root tests, Zivot and Andrews (1992) unit root tests that test structural break will be applied to the study. Zivot and Andrews results are presented in Table 5.

Structural breaks of the series were investigated by Zivot-Andrews unit root test with constant model (A) and constant + trend model (C). In the Ziwot-Andrews (1992) unit root test, critical values are obtained based on the assumption that there is no structural break in the basic hypothesis indicating the existence of a unit root. According to Zivot-Andrews unit root test results; In model A, LNEX and LNPROIL variables are stationary at 1% significance level. The LNOIL variable, on the other hand, becomes stationary at the 1st difference level. In the C model, on the other hand, only the LNEX variable is at the level, and at the 1st difference level, both LNEX and LNOIL are stationary.

In addition, the test results reveal that the break dates of 2005Q1 and 2004Q4, respectively, are statistically significant for the

Table 5: Zivot - Andrews Unit Root Test

Level								
Series	**Model A**				**Model C**			
	k	**TB**	**ZA test stat.**	**cv %1, %5, %10**	**k**	**TB**	**ZA test stat.**	**c.v %1, %5, %10**
LNEX	0	2005Q1	-6.305099***	-5.34,	0	2005q1	-7.892862***	-5.57,
LNOIL	0	2014Q4	-4.306347	-4.93,	0	2014Q4	-3.883178	-5.08,
LNPROIL	3	2004Q4	-6.865148***	-4.58				-4.82
1st difference								
Series	**Model A**				**Model C**			
	k	**TB**	**ZA test stat.**	**cv %1, %5, %10**	**k**	**TB**	**ZA test stat.**	**c.v %1, %5, %10**
LNEX	1	2005Q1	-8.231450***	-5.34,	1	2005Q1	-8.211148***	-5.57,
LNOIL	1	2008Q3	-7.510313***	-4.93,	1	2014Q3	-7.532672***	-5.08,
LNPROIL				-4.58	2	2006Q4	-3.775506	-4.82

k-optimal lag length, TB-estimated break date, ZA test stat - test statistics of ZA Unit-Root Test. Maximum lag length is 4. Critical values for test statistics were taken from Zivot-Andrews (1992). Model C at level and model A at first difference cannot be tested for LNPROIL because of near singular matrix error. Regressors may be perfectly collinear. * %10; ** %5; ***%1 is significance level

LNEX and LNPROIL variables at the level. At the 1st difference level, it is observed that the 2008Q3 break dates for the LNOIL variable are statistically significant. For this reason, a dummy variable indicating the structural break should be used in the model. Supremum-Wald test was applied to predict structural break by considering the model as a whole. The results of the test are summarized in Table 6. According to the test results, it was determined that there was a structural break in the 2005Q1 period.

In all unit root tests applied to the variables, the stationarity condition at level or first difference is met. Since the stationarity condition is satisfied, ARDL cointegration model can be applied. A dummy variable that takes into account the 2005Q1 structural break while performing ARDL bounds test analysis was added to the model as a fixed regressor. Cointegration analyzes are sensitive to lag length. In the study, the maximum lag length was taken as 8. For the delay to be appropriate, there should be no autocorrelation in this delay. After the appropriate lag length was determined, the ARDL model was estimated. A summary of the estimation results is given in Table 7. As can be seen from the results, R^2 and adjusted R^2 values are quite high. The F statistical value also indicates that the model is statistically significant.

CUSUM and CUSUM-Q, developed by Brown et al. (1975), are a method to figure out whether there is a structural break. CUSUM and CUSUM-Q graphs which are shown at Figure 4. were used to find whether there is a structural break in the model. If there are structural breaks, it is expected to eliminate the break by creating dummy variables again. If the CUSUM and CUSUM-Q graphs are within the critical limits at the 5% significance level, it is decided that the long-term coefficients are consistent. As seen in the figure, CUSUM and CUSUM-Q did not go beyond the critical limits. It is possible to express the long-term coefficients consistently.

The diagnostic tests that ensure the validity of the established model were examined and the results are presented in Table 8. With the diagnostic tests, autocorrelation problem, heteroscedasticity, normal distribution assumptions and model errors were investigated. With the Breusch Godfrey LM test, it was investigated whether there was an autocorrelation problem between the variables. Since the p-value of the test is greater than the 5% significance level, the H0 hypothesis cannot be rejected. In other words, there

Table 6: Supremum Wald Test for a Structural Break at an Unknown Break Date

Test	Statistic	P	Estimated break point
Swald	67.2480	0.0000	2005Q1

Ho: No structural break. Coefficients included in test: lnoil lnproil _cons

is no autocorrelation problem in the model. Breusch-Pagan-Godfrey and White test was used to examine whether there was a heteroscedasticity problem. Since the $P > 0.05$ in both tests, the H0 hypothesis could not be rejected, and it was found that there was no heteroscedasticity problem. The model identification error was tested with the Ramsey Reset test. Since the p-value of the test is greater than the 5% significance level, it is seen that there is no error in defining the model. In addition, the model shows a normal distribution. The results obtained from the model are reliable. As a result of the tests, it is possible to say that the model is suitable and trouble-free.

After the diagnostic tests, ARDL Bound Test was applied to the variables in order to test the long-term relationship, and the test results are given in Table 9.

The F statistic, which appeared as a result of the tests performed, is above the upper limit of the critical values at all significance levels. These results show that there is long-term cointegration among the variables. After figuring out the cointegration relationship between the series, first the short-term and then the long-term coefficients were calculated.

The cointegration coefficient is shown with "CointEq(-1)" in the Table 10. For the error correction term to be statistically significant, the value found must be a negative value between 0 and 1. As seen in the table, the estimated error correction term is statistically significant and negative. The fact that the coefficient is negative and significant supports the cointegration relationship. This result shows that the short-term imbalances in the model are eliminated in the long-term. In other words, short-term deviations for unregistered employment will show oscillations in the long-term and converge to the equilibrium point again. The estimation value of this coefficient is −0.77, which shows that in the short run, the deviation in the long-term relationship of the variables will improve in approximately 1.3 quarters (estimated between 3 and

Table 7: Summary of ARDL test

Selected Model: ARDL(1, 4, 5) Case 3: Unrestricted Constant and No Trend				
Variable	**Coefficient**	**SE**	**t-statistic**	**Probability***
LNEX(-1)	0.224438	0.085238	2.633063	0.0109
LNOIL	0.088203	0.082338	1.071227	0.2886
LNOIL(-1)	0.356470	0.125733	2.835132	0.0063
LNOIL(-2)	0.009822	0.122125	0.080427	0.9362
LNOIL(-3)	−0.181251	0.109832	−1.650258	0.1044
LNOIL(-4)	0.175536	0.078964	2.222984	0.0302
LNPROIL	0.205120	0.390985	0.524623	0.6019
LNPROIL(-1)	−0.285163	0.497327	−0.573391	0.5686
LNPROIL(-2)	−0.473068	0.495701	−0.954342	0.3439
LNPROIL(-3)	0.370695	0.497317	0.745390	0.4591
LNPROIL(-4)	1.204443	0.681460	1.767446	0.0825
LNPROIL(-5)	−1.235005	0.431629	−2.861263	0.0059
DUMMY	−0.831418	0.175003	−4.750876	0.0000
C	4.530745	0.817066	5.545143	0.0000
R-squared	0.945130	Mean dependent var		5.219858
Adjusted R-squared	0.932616	SD dependent var		0.391369
SE of regression	0.101594	Akaike info criterion		−1.560935
Sum squared resid	0.588312	Schwarz criterion		−1.114773
Log likelihood	69.41320	Hannan-Quinn criter.		−1.383511
F-statistic	75.52430	Durbin-Watson stat		1.882757
Probability (F-statistic)	0.000000			

SE: Standard error, SD: Standard deviation, ARDL: Autoregressive distributed lag model

Table 8: Diagnostic tests that ensure the validity of the model

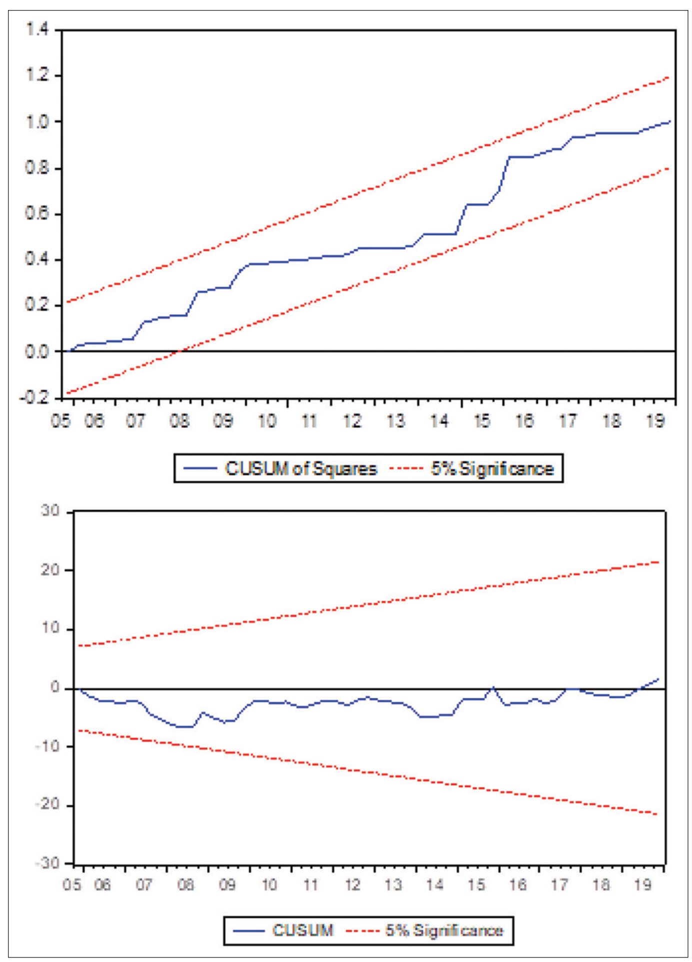
Tests	Heteroskedasticity	Serial correlation LM	Normality test	Ramsey reset
Probability	0.0765	0.7701	0.136868	0.2644

Table 9: ARDL (1, 4, 5) bound test results

F-statistic	k	Significant (%)	I(0)	I(1)
27.89853	2	10	3.277	4.243
		5	3.983	5.06
		1	5.513	6.86

K: The number of explanatory variables; Actual sample size=71. ARDL: Autoregressive distributed lag model

Figure 4: CUSUM and CUSUM of squares tests



4 months), or 77% of the deviations that will occur in the long-term balance following the short-term shocks will improve in a single period. In addition, although the structural break dummy variable reveals a statistically significant relationship with the effects of oil prices with a lag of 4 periods and oil production with a lag of 5 periods, other lagged values of both oil prices and oil production do not reveal a statistically significant relationship in the short run.

FMOLS cointegration model was applied to analyze the effect of oil production and oil prices on non-oil exports in the long run, considering the structural break. FMOLS estimation results are given in Table 11. The variables in the model are statistically significant at the 1% confidence interval. The findings indicate that before the structural break (2005Q1), the average non-oil real exports were 7.29, and after the structural break, it decreased by 0.66. It is observed that there is a statistically significant (1% significance level) and positive relationship between oil prices and the non-oil real export. A 1% increase in oil prices is expected to increase non-oil real exports by 0.53%. It is seen that there is a statistically significant (1% significance level) and negative

Table 10: ARDL(1, 4, 5) short-run coefficients

Variable	Coefficient	SE	t-statistic	Probability
C	4.530745	0.485275	9.336452	0.0000
D(LNOIL)	0.088203	0.077275	1.141415	0.2585
D(LNOIL(-1))	−0.004107	0.083294	−0.049302	0.9609
D(LNOIL(-2))	0.005715	0.072991	0.078304	0.9379
D(LNOIL(-3))	−0.175536	0.072435	−2.423340	0.0186
D(LNPROIL)	0.205120	0.305257	0.671959	0.5043
D(LNPROIL(-1))	0.132934	0.322254	0.412515	0.6815
D(LNPROIL(-2))	−0.340134	0.321351	−1.058450	0.2943
D(LNPROIL(-3))	0.030561	0.324960	0.094047	0.9254
D(LNPROIL(-4))	1.235005	0.335797	3.677836	0.0005
DUMMY	−0.831418	0.091769	−9.059916	0.0000
CointEq(-1)*	−0.775562	0.083325	−9.307646	0.0000
R-squared	0.800996	Mean dependent var		−0.009569
Adjusted R-squared	0.763893	SD dependent var		0.205506
SE of regression	0.099857	Akaike info criterion		−1.617273
Sum squared resid	0.588312	Schwarz criterion		−1.234849
Log likelihood	69.41320	Hannan-Quinn criter.		−1.465195
F-statistic	21.58876	Durbin-Watson stat		1.882757
Probability (F-statistic)	0.000000			

SE: Standard error, SD: Standard deviation, ARDL: Autoregressive distributed lag model

Table 11: Fully modified least square cointegration model with level shift

Variable	Coefficient	SE	t-statistic	Probability
LNOIL	0.533983	0.073743	7.241152	0.0000
LNPROIL	−0.478695	0.093435	−5.123285	0.0000
C	7.291094	0.598706	12.17808	0.0000
DUMMY	−0.658646	0.138638	−4.750833	0.0000

R2=0.855714, Adjusted R2 =0.849618. SE: Standard error

relationship between oil production and non-oil real exports. It is estimated that a 1% increase in real GDP by the oil sector in the long run will cause a 0.48% decrease in non-oil real exports.

4. DISCUSSION AND CONCLUSION

The aim of this research is to evaluate the presence of Dutch disease symptom in the Azerbaijan economy from a different point of view. In this context, the effect of oil prices and oil production on non-oil exports has been studied. The analyzes conclude that oil prices positively affect non-oil exports in the long run. As a result of the increase in the income level in the economy with the increase in oil prices and the increase in government expenditures, especially with the increase in transfer payments from oil revenues to the state budget, it can be expected that the non-oil sector has relatively revived and export figures will increase. Another finding obtained because of the analysis is the fact that the increase in oil production affects the decrease in non-oil exports. This finding can be considered as a symptom of Dutch disease (resource movement effect). Namely, the increase in oil production causes the resource movement towards this sector and it can be expected that it will result in a decrease in non-oil exports as a result.

Although the research has statistically significant results, it has limitations because it contains fewer variables. The lack of monthly and quarterly data on the Azerbaijani economy has led to the establishment of a model with fewer variables. Since the annual data has a smaller number of observations, it was not possible to establish a valid model. In this context, it is recommended to conduct a more comprehensive analysis for different countries, considering different variables, in future studies. Particularly, panel data analysis covering oil-rich countries and including the oil production variable will lead to more robust results on the relationship between oil production and non-oil exports.

Finally, in order to create new policies to increase non-oil exports of oil-rich countries such as Azerbaijan, which want to reduce their economy's dependence on oil, it is recommended that such studies be expanded, and recent studies be implemented by including more variables in the model.

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