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# Impact of Revenues from Oil and Non-oil Sectors on the Economic Growth of Azerbaijan

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**ABSTRACT**

The main purpose of the study is to determine the relationship between the revenues obtained from the oil and non-oil sectors of Azerbaijan, which is a country dependent on the oil industry, and its economic growth. The fact that Azerbaijan is an oil-dominated country and a large part of its exports consist of oil may have caused us to think that the share of oil in the country's incomes will be higher. However, the fact that the country generally exports oil in crude form and imports it ready-made affects the final result. In this study, the share of the oil and non-oil sectors in the economic growth of the country over a 20-year period is determined. Another aim of the study is to reveal how the earnings from these two different sectors affect the employment level of the country. During the study, the logarithm of the variables was taken and included in the analysis in order to measure the strong relationship between the data. According to the results obtained, the development of these sectors affects the decrease in unemployment levels and has be a positive result between the realized economic growth and oil revenues and non-oil sector revenues.

**Keywords:** Gross Domestic Product, Oil Revenue, Non-oil Revenue, Unemployment
**JEL Classifications:** Q43, Q49, E24, O11

## 1. INTRODUCTION

Economic growth, which is one of the most important indicators showing that a country's share in the economy is increasing, is an important variable for every country. The increase in Gross domestic product (GDP) is also expressed as economic growth. The increase in GDP also shows which goods and services the country has a weighted share in. Therefore, it is possible for us to clearly analyze the products produced and sold by the country within the scope of economic growth.

Countries with rich oil deposits gain great income from the production and foreign trade of this resource. The use of oil revenues mainly to finance social expenditures such as education and health, as well as to develop technological infrastructure and to encourage alternative production areas other than natural resource production, contributes to a strong economic growth and economic development performance in the medium and long term. However, the experiences of most natural resource-rich countries show that policies that will increase the long-term productivity capacity of the economy are not given the first priority, and that a model that will establish diversity in production is not implemented, except for oil production. The most important drawback of the dependence on oil production rather than diversity in production is that the volatility in oil prices strongly affects macroeconomic variables.

There are many studies on Azerbaijan, especially the oil sector and the revenues obtained from it. The most important reason for this is, of course, the fact that the country is an oil-based country and its share in oil exports at an international level. Hajiyev et al. (2021), in their study on the Azerbaijan and Moscow markets, revealed that increasing the competitiveness of the countries in the markets is related to increasing their superiority in the energy markets.

In the study conducted by Karimov (2015) on Azerbaijan, the development of the country's non-oil sectors, the opportunities and

threats they will create were investigated. Statistical, comparative and empirical methods were used in the study. In the study, it was concluded that with the rapid development of the non-oil sector, the competitiveness of the Azerbaijani economy will increase and the dependence on imported goods will decrease.

Many studies in the literature clearly analyze economic growth and sectoral distributions. The main part of this study is to analyze the relationship between GDP and revenues from petroleum products and non-oil products. The study is carried out on Azerbaijan and as a general result, the effect of these variables on unemployment is also discussed. From this point of view, the aim of this study is to measure how these variables, which are used to measure economic growth, are related to each other by using all three of them together.

## 2. THEORETICAL BACKGROUND

Erdogan et al. (2020) tried to measure the effect of oil price volatility on economic growth and inflation. They investigated the effects of oil price volatility on economic growth and inflation in the gulf cooperation council (GCC) countries (Bahrain, Qatar, Kuwait, Oman, Saudi Arabia and the United Arab Emirates) using monthly data for the period of 2007–2018. SVAR model was used for analysis. According to the data obtained as a result of the study, the volatility in oil prices affects economic growth negatively in most of the GCC countries and positively affects the inflation rate. Nişancı et al. (2016) examined whether there is a sensitivity to oil prices on exports, employment, public expenditures and national income in transition economies rich in natural resources. The results of the analysis revealed that there are significant movements between oil prices and the selected variables.

Akbulaev et al. (2022) stated in their study that the production and export of oil at the international level is directly related to the prices of oil. As a matter of fact, the rise in oil prices also increases the incomes of oil exporting countries. Olomola and Adejumo (2006) investigated the effect of oil price shock on macroeconomic indicators using Nigeria's data for the period 1970–2003. According to the findings, oil price shocks do not affect output and inflation, however, significant effects are observed on the real exchange rate.

Farzanegan and Markwardt (2009) investigated the relationship between oil price shocks and selected macroeconomic variables using Iran's data for the period 1875–2006. According to the findings, there is a strong positive relationship between positive changes in oil prices and industrial production growth. Van et al. (2019) investigated the effect of oil price volatility on real GDP growth using the data of 17 developed OECD countries for the period 1870–2013. In the study, countries are classified as net oil exporter and net oil importer economies. The volatility in oil prices has a negative and statistically significant effect on economic growth; however, it was found that the relationship between the variables was not the same in all countries.

Benramdane (2017) tested the data for the period 1970–2012 to investigate the effect of oil price volatility on economic growth in Algeria. According to the results, the effect of oil price volatility on economic growth is balanced by the commodity abundance effect. Omojolaibi and Egwaikhide (2013) investigated the effects of oil price on economic growth performance using the data of the five oil-exporting countries of Africa (Algeria, Angola, Egypt, Libya and Nigeria) for the period 1990–2010. According to the findings, gross investment is sensitive to the volatility in oil prices. In other words, oil price dynamics in the countries covered by the analysis determine the macroeconomic performance through the gross investment channel.

Nusair (2016) investigated the relationship between oil price shocks and real GDP using data from different periods for GCC countries. According to the results, an increase in oil prices causes an increase in real GDP, and a decrease in oil prices causes a decrease in real GDP. The effect of positive changes in oil prices on real GDP is stronger than negative changes in oil prices. In the study, attention was drawn to the reflections of the dependence on oil. Awunyo-Vitor, et al. (2018) investigated the causal relationship between the change in oil prices and economic growth for Ghana. The results revealed that the effect of the change in oil prices on economic growth in the long run is statistically insignificant. On the other hand, there is unidirectional causality running from the change in oil prices to economic growth.

Yıldız and Taha (2019) in their study in Iran; They determined the long-run relationship between oil revenues and national income. By considering the data of 1964–2016 period, the relationship between the variables was investigated with the ARDL bounds test method. It is theoretically accepted that oil revenues have a long-term effect on economic growth. According to the results obtained, it has been determined that oil revenues are effective on growth in the long run. In her study, Mehrara (2008) examined the relationship between oil revenues and output growth in oil exporting countries nonlinearly and asymmetrically, using dynamic panel series and two different oil shock definitions. According to the findings, negative oil price shocks affect output growth in the opposite direction, while positive oil price shocks have a limited effect on economic growth.

Mehrara, et al. (2010) examined the nonlinear relationship between Iran's oil revenues and real product growth rate between 1959 and 2007 using the threshold error correction model. According to the estimation results obtained from the study, it was obtained from the results of the study that the response of economic growth to the growth in oil income is higher in regimes with low oil income than in regimes with high oil income.

Demiral, et al. (2016) tried to determine how oil revenues affect economic growth in 12 selected oil-rich developing countries in their study. According to the estimation results of the one-way fixed effects model, there is a positive relationship between real gross domestic product per capita and crude oil price, crude oil exports and consumer price index; a negative regression relationship was determined between the real exchange rate. Aregbeyen and Kolawole (2015) tested the relationship between oil revenues, public expenditures and economic growth on Nigeria. Findings from the analysis revealed that oil income causes both total

government expenditures and growth, and there is no causality between government expenditures and growth in the country.

In a study by Al Rasasi, et al. in 2019, the relationship between Saudi oil revenues and the Kingdom's economic growth over the last 47 years was examined. The result is that non-oil activities' GDP measurement yielded better results than the traditionally used Private Non-Oil GDP. In the study conducted by Yardimcioğlu and Gülmez in 2013, the relationship between oil prices and economic growth in the period 1970–2011 in 10 OPEC countries was tried to be determined. As a result of the study, the long-run bidirectional causality relationship between oil prices and economic growth has been determined.

In a study by Majidli and Guliyev (2020), the relationship between Azerbaijan's non-oil real GDP growth and exchange rate and oil prices is examined. According to the results of the study, the increase in oil prices increases the non-oil real GDP growth, while the increase in the USD/AZN exchange rate has a decreasing effect. Hasanov, et al. (2018) investigated the non-oil sector effects of fiscal policy in Azerbaijan over a long period of time, including the recent example of low oil prices. As a result of the study, it has been determined that the long-term elasticity of non-oil value added compared to non-oil employment is around 5.00, and the net short-term effect of employment is negative.

## 3. RESEARCH METHODOLOGY

### 3.1. Data Set

The data required for the analysis were obtained from the Azerbaijan State Statistics Committee. The data part of the study covers the data between 2000 and 2020. All data used were evaluated annually. The aim of the study is to determine whether there is a relationship between economic growth and the oil sector, non-oil sector and unemployment levels. From the study data, the gross domestic product was taken into account as the dependent variable and it was determined how the changes in other data would affect the gross domestic product. The logarithm of the data excluding unemployment is included in the use for robust analysis.

### 3.2. Analysis Method

In this part of the study, a 20-year data set was included in the analysis. The analysis was performed using the multiple regression model in the STATA program. The data set was obtained from the Azerbaijan State Statistics Committee. In order to measure the relationship between the data more effectively, the logarithmic values of the data were taken and included in the analysis. Economic growth is considered as the dependent variable, and oil sector revenues, non-oil sector revenues and unemployment level as the independent variable.

Regression analysis is used to measure the level of relationship between variables. The regression types vary according to the dependent and independent number of the data used. If analysis is done using one variable, it is defined as simple regression analysis, if more than one variable is used, multiple regression analysis is defined.

If we set up the equation for the simple linear regression model, we can express it as follows: (Ajayi 2017)

$$Y = \beta_0 + \beta_1 X + \varepsilon \qquad (1)$$

In this equation, while X represents the independent variable, the value of y represents the dependent variable. The value of $\beta_0$ represents the value of Y when X=0. The $\beta_1$ value also represents the regression coefficient. That is, if our independent variable changes by one unit, our dependent variable shows how it responds. The $\varepsilon$ value is shown as the error unit.

If the number of variables used in the study is more than one, a multiple regression model is used. In this model, we create the new model by adding the number of independent variables to the equation. We can represent the multiple regression model as follows.

$$y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{2i} + \varepsilon_i \qquad (2)$$

The variable $\beta_2$ in the equation represents the new variable that appears in the independent variables. If the number of variables used in the study is n, the model is set up as follows:

$$y_i = \beta_0 + \beta_1 X_i + \beta_2 X_{2i} + \ldots + \beta_p X_{pi} + \varepsilon_i \qquad (3)$$

## 4. ANALYSES AND RESULTS

Since the number of independent variables used in the study was more than one, the multiple regression model was chosen. If we create a multiple regression model over the data of the study, our model will be

Growth (y) = $\beta_0$ + $\beta_1$ oil sector (x) + $\beta_2$ non-oil sector + $\beta_3$ unemployment + $\varepsilon$

is established as. However, since the logarithm of the variables is taken, our revised model changes as follows:

Loggrowth (y) = $\beta_0$ + $\beta_1$ log_oil sector (x) + $\beta_2$ log_non-oil sector + $\beta_3$ unemployment + $\varepsilon$

Hypotheses put forward in the study:
- $H_0$: There is no relationship between economic growth and the oil sector, non-oil sector and unemployment
- $H_1$: There is a relationship between economic growth and the oil sector, non-oil sector and unemployment.

Afterwards, a series of assumption tests were conducted to move on to multiple regression analysis. These tests and the achieved values are given respectively.

The first test is the VIF test. The purpose of the VIF test is to confirm whether there is a relationship between the independent variables. Accordingly, the VIF value must be within a certain range. In most literature, it is accepted to increase the VIF value up to 10. However, a value around 5 is a more robust indicator. Since the value we obtained in our study was below 5, the analysis

can be continued (Table 1). The meaning of the VIF value is that there is no multicollinearity problem in our model.

In the second stage, it is determined whether the homoscedasticity assumption is met in the model. For this purpose, the Breusch-Pagan/Cook Weisberg test was applied at this stage of the study. The obtained results indicate that the H0 hypothesis should be accepted (Table 2). Thus, it is confirmed that there is no variable variance problem in our model.

In the next step, the Breusch-Godfrey LM test was applied to determine whether there is an autocorrelation problem between the error terms. We have two accepted hypotheses, $H_0$ shows that there is no autocorrelation problem between the error terms, and $H_1$ shows that there is an autocorrelation problem between the error terms. $H_0$ hypothesis is accepted because the value we reached as a result of our analysis is >0.05 (Table 3). Thus, there is no autocorrelation problem among our data.

The normal distribution between error terms was also measured by another test, the Shapiro-Wilk W test. H0 hypothesis is accepted because the value reached as a result of this test is >0.05. As a result of a series of tests, it is determined that there is no problem for the transition to the regression model (Table 4).

Since our probability value is <0.05 according to the result of the latest multiple regression model, the model has the power to explain the relationship between the variables. R-Chi-square

and corrected Chi-square value results reveal that the analysis shows a meaningful result. A significant relationship was obtained between the earnings from the oil and non-oil sectors and economic growth (Table 5). The development of both sectors positively affects the total economy. However, no significant relationship was found between unemployment levels and economic growth. We can show that the most important effect of these reasons, which occur in the petroleum-related part, is that petroleum products are generally exported in crude form. As a result, the $H_1$ hypothesis is accepted between economic growth and oil revenues. Likewise, the $H_1$ hypothesis is accepted between economic growth and non-oil sectors. According to the results obtained, no significant relationship was found between economic growth and unemployment levels. In other words, the $H_0$ hypothesis is accepted among these variables.

## 5. DISCUSSION AND CONCLUSION

The main purpose of the study is to measure the relationship between the revenues of Azerbaijan, which is an oil-dominated country, from the oil sect and non-oil sectors, and its economic growth. Unemployment levels, which are an indicator of economic growth, are also included in the analysis. The study includes a set of data from 20 years. During the course of the study, a series of hypothetical tests were conducted. VIF and Shapiro-Wilk W tests are examples of tests performed. Since valid results were obtained to make the regression model in the tests, the analysis was performed using the multiple regression model.

As a result of the analyzes made within the scope of this study, a positive result was obtained between economic growth and income from the oil and non-oil sectors. A meaningless conclusion was reached between the level of unemployment and economic growth.

The results of this study are consistent with the results of previous studies in the literature. Namely, in the study conducted by Karimov (2015), it was concluded that with the rapid development of the non-oil sector, the competitiveness of the Azerbaijani economy will increase and the dependence on imported goods will decrease. Aliyev and Dehning (2016) show that government spending in the long-run has a positive effect on the non-oil sector, but tax revenues to the budget limit this positive impact. Aliyev and Mikailov (2016) studied the impact of different types of government spending on the non-oil sector, found that capital and other spending have a negative, and social spending has a positive and statistically significant impact on the growth of the non-oil economy. Hasanov et al. (2018) found that the non-oil sector of the Azerbaijani economy has a weak but positive response to fiscal measures in the long and short term. According the results of the study by Majidli and Guliyev (2020), the increase in oil price increases real non-oil GDP growth, and the increase in USD/AZN exchange rate has a decreasing effect on it.

Considering the studies in the literature on economic growth and energy, it is seen that these studies analyze the relations between production and income levels and GDP. However, in future studies, investigating the relationship between non-oil, especially service oil-based service industry and economic growth may provide

**Table 1: VIF test results**

| Variable | VIF | 1/VIF |
|---|---|---|
| Oil sector | 2.85 | 0.068255 |
| Non-oil sector | 1.06 | 0.135531 |
| Unemploymernt | 1.04 | 0.108455 |
| Mean VIF | 4.95 | |

**Table 2: Breusch-pegan/cook-weisberg test results**

$H_0$: Constant variance
Variables: Fitted values of log_GDP
Chi-square (1) = 1.26

Prob>Chi-square=0.2622

**Table 3: Breusch-godfrey LM test results**

| Lags (p) | Chi-square | df | Prob > Chi-square |
|---|---|---|---|
| 1 | 3.308 | 1 | 0.0689 |

**Table 4: Shapiro-wilk W test results**

| Variable | Obs | W | V | z | Prob >z |
|---|---|---|---|---|---|
| Error term | 21 | 0.91797 | 2.010 | 1.412 | 0.07903 |

**Table 5: Multiple regression analysis result**

| R squared | Adjtused R squared | Prob >F |
|---|---|---|
| 0.9997 | 0.9996 | 0.0000 |
| **GDP** | **Standart error** | **Coeff** |
| Oil | 0.0147875 | 0.4407687 |
| Non-oil | 0.0118202 | 0.5705678 |
| Unemployment | 0.005925 | 0.0074023 |

opportunities for future studies. In particular, studies on brand value that affect economic growth can shed light on this trend (Huseynli, 2022).

The fact that the oil sector does not have a large structure to be predicted in the growth of the country, which is generally oil-dominated and exports oil, depends on the country's export of crude oil products. Oil, which is exported at a cheaper price and in crude form, not only causes the country to earn less, but also causes the country to buy processed petroleum products at higher prices in the future. This process, in turn, reflects its own impact on less realization of expected growth. Exporting it in processed form in order to obtain and earn maximum income from the resources owned will contribute significantly to the achievement of the expected growth.

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