Empirical Research on the Effect of Oil Revenues on Government Debt in The Case of Azerbaijan

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ABSTRACT

Oil is one of the leading natural resources used to increase the welfare of countries. Especially in Azerbaijan, which is an oil-based country, the importance of oil in the revenues provided to the state treasury cannot be denied. As a matter of fact, these revenues are important within the amount of foreign debt acquired for capital development. Borrowing is one of the financing tools that governments frequently use for various reasons and purposes. Revenues obtained from two main channels are used for the state to fulfill its responsibilities and investments. The aim of this study is to investigate the effect of oil revenues on government debt in Azerbaijan. Annual data between 2000 and 2020 used in the research were obtained from the World Bank. In the study carried out within the framework of a bivariate model, logarithmic values of the variables were included in the analysis. As a result of the empirical research, it was determined that there was no strong and significant relationship between the two variables. This may be because the country is still dependent on oil, its non-oil sectors are not sufficiently developed, and as a result, its non-oil revenues are very low.

Keywords: Macroeconomics, Government Debt, Oil Revenues, Granger Casuality, Azerbaijan
JEL Classifications: H60, H27, E60, O13

1. INTRODUCTION

The main purpose of economic policies followed by countries is to increase the welfare of the population. Welfare growth is possible by increasing the total production obtained as a result of the most efficient use of physical, human, and natural resources (Jabiyev et al., 2022). In countries rich with natural resources, increasing the welfare of society by using these resources is one of the important strategies of governments. Oil is one of the primary natural resources used to increase the welfare of countries. The importance of the impact of changes in oil prices on the global economy and the recent decline in oil prices have increased the urgency and need for research on this issue, which has undoubtedly increased the interest in researching the impact of oil prices on the global economy (Mukhtarov et al., 2021). Because it is crucial for

the production and consumption of products and services needed for daily life, energy is vital to modern economies and promotes economic development (Huseynli, 2022a).

On the other hand, after the Second World War, war-affected countries turned to borrowing from other organizations to rebuild their economic systems. In addition, the wave of globalization that began to accelerate in the 1980s facilitated capital flows between countries and led to the expansion of debt relations. In theory, it is accepted that economic growth depends entirely on investment and that local resources are not sufficient for investment. For this reason, external borrowing is considered the most appropriate strategy for governments (Jabiyev et al., 2022). Borrowing is one of the financing tools that governments frequently use for various reasons and purposes. Incomes from two main channels are used

for the state to fulfill its responsibilities and investments. These are income and tax revenue from the use of natural resources. As stated by Bilginoğlu and Aysu (2008), the government still sees borrowing as a source of financing since increasing taxes or reducing expenditures is not considered economically and politically appropriate.

The positive or negative effects of public debt on the economy may vary depending on the current economic situation. The relationship between public expenditures and economic growth may depend on the economic characteristics of countries. As many of countries, Azerbaijan also has a debt burden that it has been borrowing from various international financial institutions such as European Bank for Reconstruction and Development (EBRD), Asian Development Bank (ADB), World Bank (WB), Islamic Development Bank (IDB) or individual countries for many years.

The main source of income of the Azerbaijani state is the income from oil and natural gas. The economy of Azerbaijan, which left the former Soviet Union in 1991 and regained its independence, declined sharply between 1991 and 1994. Some of the main reasons for this are: regaining independence, operating in a socialist economic system until the transition to a free market economy, occupation of part of its territory by Armenia, displacement of more than 1 million refugees, new creation of private property, not many people familiar with the free market economy, etc.

For this reason, from 1995 to 2003, the debt/GDP ratio was high, and the loans received were largely used to close the budget deficit. Although the public debt has increased recently, it is seen that the public debt/GDP ratio has not reached a level that could pose a risk.

Intergenerational equity is a major issue for natural resource exporters, as oil, gas and mineral revenues are limited. States that choose the real income approach convert the income from the sale of natural resources into financial assets and spend only the interest arising from these assets. Since it has a restrictive structure, this path ensures that real oil revenue is made available to future generations. This spending rule is not directly linked to oil price fluctuations, as only income from financial assets is spent.

Financial sustainability is very important for proper management of oil revenues. According to the OECD (2009: 86), fiscal sustainability 'includes the solvency of the government, ongoing stable economic growth, stable taxes and intergenerational justice'. In other words, sustainable fiscal policy is a policy that can be achieved without making major changes in tax and spending patterns. In general, the problem of fiscal sustainability is particularly acute in resource-rich countries because large revenue streams from oil, gas or mineral exports can lead to income volatility and exchange rate distortions.

Azerbaijan established the State Oil Fund of the Azerbaijan Republic (SOFAZ) in late 1999 to accumulate income from hydrocarbon exports. SOFAZ has gradually become the leading part of the country's public finance system. Azerbaijan was the first country to fulfill all requirements of the Extractive Industries Transparency Initiative (EITI), an international agreement to implement global standards of transparency in the resource extracting sectors. However, SOFAZ's contribution to an effective resource revenue management and long-run economic development is still questionable: transparency applies only to the income side of Azerbaijan's oil fund while the expenditure side remains opaque. Unlimited and unconditional transfers from SOFAZ to the state budget have threatened fiscal sustainability and the overall macroeconomic equilibrium (Aslanli, 2015).

In this case, public consumption will be affected only by changes in accumulated financial assets, not by changes in the current value of revenues. However, this approach is not suitable for low-income and natural resource-rich countries because these countries are both capital and credit constrained (Baunsgaard, Villafuerte, Poplawski-Ribeiro, & Richmond, 2012). Fiscal policy in most oil-exporting countries has been expansionary in recent years due to high oil prices. Energy is of vital importance for contemporary economies because the need for energy in the production and consumption of goods and services necessary for daily life triggers economic growth (Huseynli, 2022). Taking all these into consideration, the aim of this study is to investigate the effect of oil revenues on government debt in Azerbaijan.

2. LITERATURE REVIEW ON GOVERNMENT DEBT AND OIL REVENUES

Modern theories of sovereign debt began with Barro (1974) and his Ricardian equivalence result. In this case, taxes are lump sum and therefore the composition of expenditure financing is irrelevant. There are also those who advocate allowing the government to collect taxes in a certain period based on income earned in previous periods. According to Bassetto and Kocherlakota (2004), if this is implemented, given any debt path, the government will be able to adjust its tax policy to achieve that debt path without affecting equilibrium allocations or prices. Assuming a constant interest rate, Barro (1979) shows that when exogenous government spending fluctuates, debt should be used to correct distortionary taxation. This model also explains how government debt increases in wartime, but it does not explain why debt increases in many countries in peacetime (i.e., when there is no increase in spending). More importantly, the theory predicts that debt levels are irrelevant to the current debt problem, meaning that debt moves randomly according to government spending and income shocks (Martin, 2009).

A study by Rogoff and Reinhart (2010) found that there is a negative correlation between government debt and growth for countries with debt above 90% (of GDP). Checherita-Westphal and Rother (2012) stated that the range of government debt that negatively affects growth is between 90% and 105% of GDP. Minea and Parent (2012) found that public debt is negatively correlated with growth when public debt is between 90% and 115% of GDP, but the correlation is positive for countries where public debt is above 115% (in total). found that it was. In the study conducted by Kourtellos et al. (2013), it was determined that the relationship between government debt and growth was statistically insignificant for developed economies.

The study by Égert (2015) found that the negative non-linear correlation between public debt and growth occurs at much lower levels of public debt (between 20% and 60% of GDP). Ghourchian and Yilmazkuday (2020) compared the effects of public consumption and public debt on economic growth using data from 83 countries, including both developed and emerging markets, over the period between 1960 and 2014.Jabiyev et al. (2022) investigated the long-term relationship between public debt and economic growth in Azerbaijan with annual data covering the period from 1995 to 2020.

In the study conducted by Farajova (2011), the relationship between the budget deficit and macroeconomic fundamentals was investigated using Azerbaijani data. In the study conducted by Bildirici and Kayıkçı (2013), in other oil-exporting Eurasian countries, including Azerbaijan, oil production and revenues are very tightly linked to GDP and a 1 percent increase in oil production will increase GDP by approximately 1%. has been found. Azhgaliyeva (2014), in her study based on data from Kazakhstan, found that the real value of oil production increases real government expenditures, but the country's national oil fund reduces this undesirable effect on the appreciation of the real exchange rate to some extent.

Gurbanov et al. (2017) examined quarterly time series data on oil prices, public capital formation, non-oil exports, and non-oil GDP to estimate long-term relationships linking oil prices to government investment expenditures as well as non-oil oil production in Azerbaijan. Mukhtarov et al. (2021) examined the impact of oil price shocks on GDP per capita, exchange rate and total trade turnover in Azerbaijan for the period 1992–2019.

In the study conducted by Huseynli (2023a), the causal relationship between economic growth, foreign investments, total capital increases in the country and oil and gas sector revenues in Azerbaijan for the period from 2000 to 2020 was examined. In the study conducted by Salaudeen (2023), the impact of crude oil revenue on the oil and non-oil sector production performance in Nigeria was evaluated using data for the period between 1981-2020. In the study conducted by Huseynli (2023b), the potential, current situation, future strategies and policies of solar energy, a renewable resource in Azerbaijan, were examined.

3. RESEARCH METHODOLOGY

3.1. Data Set
The statistical data used for the study were obtained from the World Bank platform. In the study conducted within the framework of a two-variable model, the logarithmic values of the variables were included in the analysis. The study consists of annual data between 2000 and 2020. Azerbaijan's oil revenues (Figure 1) and foreign debt (Figure 2) for the years 2000-2020 are shown comparatively (Figure 3).

3.2. Analysis Method
Statistically, causality is the result of the estimated future values of a time series variable being affected by the past values of itself or another related time series variable. Granger causality test was
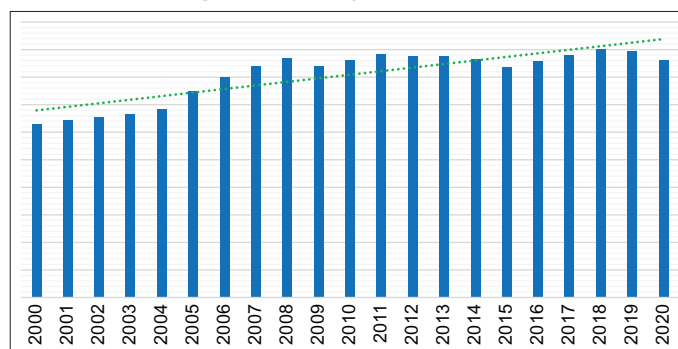

Figure 1: Azerbaijan's oil revenues
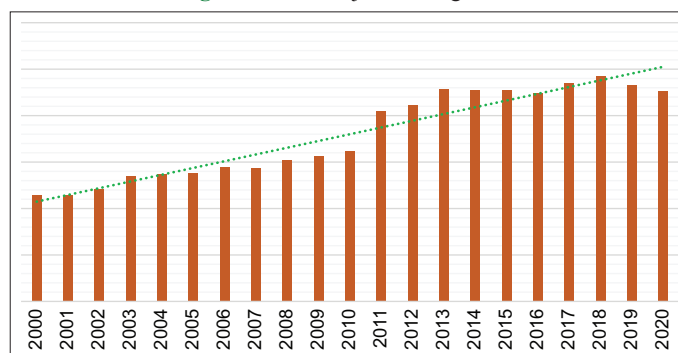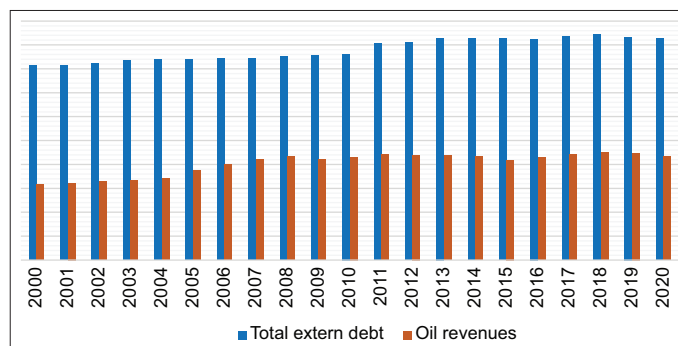

Figure 2: Azerbaijan's foreign debt

Figure 3: Comparison of Azerbaijan's oil revenues and foreign debt

developed and used by Granger (1969) to determine whether there is a causal relationship between two variables. As a result, if a causal relationship is found between the variables, this time the direction of causality is determined. Granger causality has emerged as a useful concept in economics and econometrics to characterize dependency relationships between time series (Granger, 1969).

The Granger causality test is a statistical hypothesis test for determining whether one time series is a factor and offer useful information in forecasting another time series. Given two stochastic variables, and there is a causal relationship (in the sense of Granger) between them if the past observations of Y help to predict the current state of X, and vice-versa. If so, then we say that Y Granger-causes X.

In other words, if having knowledge of the past values of variable X allows Y to be predicted more precisely, then variable X causes variable Y in the Granger sense. One of the most important

prerequisites for Granger causality analysis is that the variables are stationary at level. For this reason, before applying Granger causality analysis, the stationarity of the variables is determined by unit root tests (Granger, 1969).

The concept of cointegration was first introduced by Granger (1981) and Granger and Weiss (1983). It was further expanded by Engle and Granger (1987). Cointegration describes the existence of an equilibrium or stationary relationship between two or more time series, each of which is individually non-stationary.

Cointegration analysis explains whether there is a long-term relationship. However, cointegration analysis cannot explain the direction of the relationship. Granger causality analysis, developed by Engle and Granger (1987) based on the error correction model, is used to explain the direction of the relationship.

4. ANALYSIS AND RESULTS

The variables required for the model are included in equation 1. As can be seen from the equation, oil revenues and government debts are the variables of our model.

$$Variables = f(CO_2, R\&D) \tag{1}$$

Two models were established to measure whether the variables affect each other. In each of them, one variable is considered as dependent and the other independent. Our models are in Equation 2 and Equation 3.

$$Goverment\ debt = \beta_0 + \beta_1\ oil\ revenues \tag{2}$$

$$Oil\ revenues = \beta_0 + \beta_1\ goverment\ debt \tag{3}$$

After the model was established, the necessary statistical tests were applied before moving on to causality. In the last stage, the causality test was applied. Information regarding the analysis is given in the tables respectively.

ADF test was applied to measure the stationarity levels of the variables whose logarithmic values were taken. According to the ADF test results, both variables are not stationary at level. Stationarity information regarding the ADF test is explained in Table 1.

In the ADF test results performed to make the data stationary, it is seen that the data set has become first order stationary. Data regarding first-order stationarity are explained in Table 2.

After the ADF test results were obtained, the next step, the VAR model, was established and the appropriate lag length was determined based on statistics. Information containing appropriate delay data is included in Table 3.

If the data were maintained, each of them became first-order stationary as a result of the ADF test. Johansen participated in

Table 1: Level values of series

ADF test	Goverment debt		Oil revenues	
resault	t-statistics	Possibility	t-statistics	Possibility
ADF testing statistics	−0.722265	0.8179	−1.910930	0.3206
Test critical values				
1%	−3.831511		−3.831511	
5%	−3.029970		−3.029970	
10%	−2.655194		−2.655194	

Table 2: Stationarity level of first order series

ADF test	Goverment debt		Oil revenues	
resault	t-statistics	Possibility	t-statistics	Possibility
ADF testing statistics	−4.009137	0.0073	−2.265811	0.0263
Test critical values				
1%	−3.857386		−2.699769	
5%	−3.040391		−1.961409	
10%	−2.660551		−1.606610	

Table 3: Appropriate delay length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1.326535	NA	0.003752	0.089795	0.184202	0.088790
1	30.33133	46.40768	0.000135	−3.244178	−2.960958	−3.247195
2	30.99355	0.882954	0.000220	−2.799140	−2.327106	−2.804168
3	42.89976	12.69996*	8.50e-05	−3.853302	−3.192455	−3.860341
4	47.53640	3.709309	9.69e-05	−3.938187	−3.088526	−3.947237
5	63.01230	8.253813	3.25e-05*	−5.468307*	−4.429833*	−5.479369*

*Indicates the appropriate lag length for the relevant test.

Table 4: Johansen cointegration test results

Hypothesized no. of CE (s)	Eigenvalue	Trace statistic	0.05 Critical Value	Significant value
None	0.571693	19.30241	15.49471	0.0127
At most 1	0.249879	4.887850	3.841466	0.0270

Table 5: Granger causality test

Hypotheses	F-value	Probability value (p)	Decision at 1% significance level
Oil earnings affect government debt	1.759318	0.4149	Rejected
Government borrowing affects oil revenues	0.962733	0.6179	Rejected

the cointegration test. The cointegration test indicates that the existence of independent and independent variables continues in the long run. As can be seen from Table 4, the H_0 hypothesis is red and the H_1 hypothesis is accepted. It remains evident that there is a long-term effect among these changing variables.

After the necessary tests were applied, the Granger test was used. Information on Granger causality is given in Table 5. Information showing the causality between both variables is given in Table 5.

As can be seen from the Granger results, no causality was found in the data in the causality test conducted for Azerbaijan. In other words, revenues from oil sales do not affect government debts in any way. Likewise, an increase or decrease in government borrowing does not have any effect on oil revenues. Thus, for both hypotheses, the H_1 hypothesis is rejected and the H_0 hypothesis is accepted.

5. DISCUSSION AND CONCLUSION

As a result of the study by Farajova (2011), it was determined that there was a long-term causality from the current account, real interest rate, GDP, inflation and exchange rate to the budget deficit, but no short-term causality was found from the interest rate to the budget deficit. Gurbanov et al. (2017) revealed that, despite large government investment expenditures, extremely little non-oil production of the type subject to trade is produced. Arezki and Ismail (2013) analyzed the oil revenues of 32 oil-exporting countries, including Azerbaijan, with panel data analysis. The study showed that current government spending tends to increase when oil prices rise but does not decrease when oil prices fall. Mukhtarov et al. According to the results of the study conducted by Mukhtarov et al. (2021), Azerbaijan and similar oil-exporting countries need to reduce the dependence of GDP per capita, exchange rate and total trade turnover on oil resources and their prices in the global market. As a result of the study conducted by Huseynli (2023a), a bidirectional causality relationship was determined between economic growth and foreign investments in Azerbaijan. According to the results of the study by Salaudeen (2023), while crude oil revenue has a positive and insignificant effect on non-oil sector output in the short term, it has a negative but significant effect in the long term. The most important strategic goals have been determined for the use of renewable and alternative energy sources in Azerbaijan in order to reduce dependence on oil revenues and benefit from the solar energy potential of the country in order not to lose its main role in the energy sector. Thus, increasing the share of renewable energy investments in the country's total energy balance to 30% by 2030 has been determined as the main target (Huseynli, 2023b).

After gaining its independence, Azerbaijan's transformation into a world-class oil producing and exporting country, in short, its ability to generate income by opening its energy resources to the outside world, started with the "Contract of the Century" signed in 1994. As a result of the agreement, the revenues obtained from the export of produced energy resources to world markets have been important in the growth of the country. However, not only oil revenues but also government borrowings were important

in growth. The fact that debt has a negative impact on a state, especially in terms of transferring it to future generations, requires that these debts be repaid on time. Oil revenues have become vital for Azerbaijan, a country dependent on oil in terms of resources. Oil revenues are the main factor in the formation of the state budget. In this study, oil revenues and foreign borrowing, which provide important reserve input in the development of the country's economy, are emphasized. An attempt was made to measure the relationship between these two variables. As a matter of fact, it was thought that oil revenues had a serious impact on the payment of foreign debts. Unfortunately, the results obtained reveal that there is no strong significant relationship between the two variables. The reason for this may be that the country is still dependent on oil, the non-oil sectors are not sufficiently developed, and as a result, its non-oil revenues are very low. In addition, it is thought that budget expenditures related to litigation have caused the relationship between these two variables to be meaningless in the current period.

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