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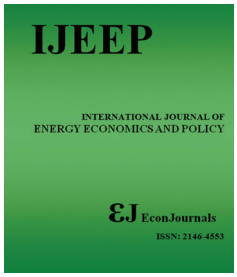

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Causality Relationship between the Development of the Oil and Gas Sector and Foreign Investments

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ABSTRACT

In this study on Azerbaijan, which is dependent on oil, the causality relationship between economic growth, foreign investments, total capital increases in the country and oil and gas sector revenues have been examined. As a result of the analysis made using the Granger method, a row of causality relationships was obtained. The data used in the analysis were obtained from the World Bank, an important data disclosure platform. The result of the analysis made for a period from 2000 to 2020 shows the importance of the oil and gas sector in attracting foreign investments in this country. As a result of the study, a bidirectional causality relationship was obtained between economic growth and foreign investments in Azerbaijan. In other words, while attracting foreign investments to the country supports economic growth, the realization of economic growth at the same time shows its own effect on the growth of the country's economy. Namely, these variables become the Granger causality of each other. Bilateral causality relationship has also been determined between foreign investments and the incomes obtained from the total oil and gas sector. At the same time, the development of this sector makes the country more attractive for foreign investors. Increases in revenues in the oil and gas sector also have an impact on the overall capital increase in the country. In other words, this variable is the Granger cause of capital increases.

Keywords: Oil, Gas, Energy Sector, Foreign Investments, Azerbaijan
JEL Classifications: O13, Q40

1. INTRODUCTION

Foreign Direct Investment (FDI) is referred to as an investment aimed at generating long-term returns from an investment firm in a trade in a different economy (Husain et al., 2021). In general, FDI is viewed as a financial enterprise resulting from capital growth (Mkpakan, 2004). However, FDI is often perceived as a major priority in the central government's development strategy in developing countries (Du et al., 2008).

FDI not only plays a vital role in the development of an industry, but also significantly influences macro and micro levels (Nejati and Bahmani, 2020). The influx of foreign direct investment can have direct effects such as increasing the capital stock, providing access to modern technology, improving employment, stimulating production and tax revenues, increasing the foreign exchange supply and increasing exports in the host country (Blomstrom et al., 2000; Anwar and Nguyen, 2010). Foreign companies can indirectly affect the host country by influencing the productivity of local companies, known as the "spillover effect" (Görg and Strobl, 2003; Hamida, 2013).

Markusen (1997) argues that various services and production are located in different countries for different reasons, depending on the availability of certain factors of production. In particular, production using relatively low-skilled labor will take place in countries with relatively abundant labor, leading to vertical FDI (Kemme et al., 2021). Most countries are trying to remove barriers to foreign investment and adopt policies that can facilitate FDI inflow. According to UNCTAD's annual report for 2018, the ratio

of global FDI stock to GDP increased from 9.58% to 39.24% in the period 1990–2017. This rate increased from 9.32% to 43.79% in developed countries and from 12.86% to 32.58% in developing countries (Nejati and Bahmani, 2020).

With all this, industry is driven by energy production, which provides the vital functions of the state and at the same time guarantees its security and independence. Energy production is a vital component of the world economy.

In a study by Ahmadova et al. (2021), the characteristics of the diversification of the Azerbaijani economy were evaluated, the dependence of the country's economic development on the degree of diversification of the economy and exports was analyzed. As a result of the study, it has been revealed that it is necessary to develop processing industries, expand the access of small and medium-sized enterprises to financial resources and encourage foreign investment in the non-oil sector in order to overcome oil dependence and ensure effective economic diversification.

The development and future of the country's economy largely depends on the energy sector. Widiyanti et al. (2019), energy is the only thing that can meet the development needs of the country. The energy sector is of particular importance for the future development of the country as it must develop as a competitive country and maintain a stable economic conflict. As a result of globalization, increasing international trade volume and widespread internet use, people are forced to consume more. In order to mix inputs and generate an output, energy is needed. Consumption of energy enhances living standards as well as economic growth. For the implementation of practically any direct and indirect generation, there is always an energy requirement (Huseynli, 2022a).

Considering all these, the aim of this study is to investigate the causal relationship between economic growth, foreign investments, total capital increases in the country and oil and gas sector revenues in Azerbaijan.

2. REVIEW OF LITERATURE

2.1. Foreign Investment

Heinrich et al. (2002) examined the political economy of foreign direct investment in the Russian oil and gas industry to explain the limited role of foreign capital in this sector. Foreign direct investment is defined as an investment made in a company operating in a country other than the host country's investors to make permanent profits and to obtain at least 10% of the equity share (Mwilima, 2003). According to another definition, FDI can be seen as a long-term investment by an international industrialist in a business located far from his home country (Hill, 2005). A study by Ghosh Roy and Van den Berg (2006) demonstrated the positive and major effects of foreign direct investment (% of GDP) on economic development for the USA.

In a study by Myachin et al. (2015), the investment attractiveness aspects of the constituent entities of the Russian Federation, where the Special Economic Zones (SEZ) mode is implemented, are reviewed. As a result of the study, the importance of small business development in creating a suitable investment environment has been revealed. A study by Murari (2017) based on data from 1980 to 2013 examined the link between financial development and economic development as a GDP for South Asian countries. As a result of the study, it was concluded that FDI and domestic investment contributed to South Asian countries. A study by Sahoo and Sethi (2017) examined the causal relationship between foreign direct investment and economic development for India and found that India's public development policy should focus on the profitable use of foreign direct investment and domestic investment.

A study by Husain et al. (2021) is to find out the impact of foreign direct investment on manufacturing industries in Oman, based on primary and secondary data from the World Bank database (1984-2018). The results of the study found that spillover effects on local companies such as new technology, marketing strategies, organizational skills, money, jobs, export growth, diversification of the economy and more competition led to increased domestic market efficiency and increased efficiency in skills. In a study by Grabara et al. (2021), the relationship between foreign direct investment, economic growth and renewable energy consumption in Kazakhstan and Uzbekistan was discussed in the light of data obtained from 1992 to 2018. As a result of the study, it has been revealed that there is a two-way link between foreign direct investment and renewable energy consumption in these two countries.

FDI is a source of financing that enables companies to grow. FDI can also be a driver for promoting energy efficiency innovation (Grabara et al., 2021). Arain et al. (2021) investigated the effect of foreign direct investment (FDI) on Pakistan's economic growth. As a result of the study, it was shown that FDI did not cause CPI in any leg value (as its effects were not significant) and the effects of CPI on FDI were not significant in the first lag, but these effects became significant in the second and third lags, respectively. Arain et al. (2021) investigated the effect of foreign direct investment (FDI) on Pakistan's economic growth. As a result of the study, it was shown that FDI did not cause CPI in any leg value (as its effects were not significant) and the effects of CPI on FDI were not significant in the first lag, but these effects became significant in the second and third lags, respectively.

A study by Luu et al. (2022) investigated how re-centralization could affect foreign direct investment (FDI) inflows in Vietnam. As a result of the study, it was revealed that re-centralization led to a significant decrease in foreign direct investment inflows. A study by Luu et al. (2022) investigated how re-centralization could affect foreign direct investment (FDI) inflows in Vietnam. As a result of the study, it was revealed that re-centralization led to a significant decrease in foreign direct investment inflows. In a study by Ezejiofor and Emeneka (2022), the effect of leverage on the social sustainability reporting of listed oil and gas companies in Nigeria was examined.

2.2. Foreign Investment and Oil-gas Sector

Traditional energy has historically been the most popular option and is still in use today (Huseynli, 2022b). Although renewable

energy sources have been put forward in recent years, energy has been produced from oil and natural gas sources for decades. Oil and natural gas are also fuel sources for pharmaceuticals, solvents, fertilizers, pesticides, and other chemicals, including plastics (Anderson, 2017). If fossil fuel prices continue to rise, fossil fuel companies will need to develop new technologies and strengthen their operations to increase efficiency and enhance existing capabilities (Sircar et al., 2021).

A study by Nejati and Bahmani (2020) tried to examine the effects of FDI in the oil and gas sector on the Iranian economy using a regional CGE model. As a result of the study, it has been shown that if FDI does not lead to productivity spillover, it causes Dutch disease in Iranian economy.

Dube (2009) and Tang (2009) described the cointegration between energy consumption and foreign direct investment in South Africa and Malaysia. According to Mudakkar et al. (2013) found that causality differs from energy consumption to FDI in Bangladesh and Sri Lanka, whereas causality ranges from FDI to energy consumption for India. Azam et al. (2015) revealed that both FDI and GDP are significantly correlated with energy consumption in Thailand, Malaysia and Indonesia.

In a study by Filimonova et al. (2020), the impact of foreign investment on the development of the oil and gas sector in Russia was analyzed. Today, the interdependence experienced on a global scale has gained even more importance with the increasing demand for energy resources. In a devastating competitive environment, hydrocarbons, especially natural gas, continue to be an important competitive tool as a strategic energy source (Tutar et al., 2022). A study by Sircar et al. (2021) provides a state-of-the-art in-depth review of machine learning and artificial intelligence to solve oil and gas industry problems.

3. RESEARCH METHODOLOGY

3.1. Data Set

Variables that are reliable in the explanation of macroeconomic data and used on an international basis are popularized by a few institutions. One such institution is the World Bank. As a matter of fact, the data part of this study was obtained from this institution. Among the variables described as different slices, those on an annual basis were preferred in this article. Granger Casuality test, which is one of the methods that best measures the causality relationship, was preferred for analysis. The data covers the period from 2000 to 2020. The main purpose of the study is to investigate the causality of Azerbaijan, which is oil addicted and earns serious income from this sector, in attracting foreign investment and in total capital increases. The variables in the study are economic growth, foreign investments, total capital increases and revenues from the oil and natural gas sector. Logarithmic values of the variables in the study were used to obtain more robust results.

3.2. Analysis Method

The more data available to measure a relationship, the more robust the result. In this study, a 21-year data set is used to measure causality. Data obtained from the World Bank were analyzed using the Ewievs program. The amounts in the data set are given in dollars.

In the Granger causality, it is important to do co-integration tests on the variables in order to determine whether or not there is a long-term equilibrium link between the variables. This may be done in order to assess whether or not there is a relationship. Engle and Granger (1987) came to the conclusion that a non-stationary time series combined with a linear function can produce a stationary result. In the event that such a stationary linear combination does exist, then the co-integration of non-stationary time series is performed.

Granger (1988) explains that the term "co-integration" refers to a situation in which two or more non-stationary variables are integrated in the same order with the stationary of residuals. Granger proposed that if two time series variables are not co-integrated, then there may be unidirectional or bidirectional Granger causality in the short run. This was based on the idea that co-integration ensures that no Granger causality exists. Both hypotheses on the rank of co-integration (the number of linearly co-integrating vectors) and hypotheses on the shape of co-integrating vectors may be assessed using the Johansen test.

4. ANALYSES AND RESULTS

In order to apply the Granger analysis, a series of tests must first be applied. If necessary, consistency is achieved, analysis can be started. One of these tests is to measure whether the data set is stationary. The values given in Table 1 show us that this data set is not stationary. So, the H_0 hypothesis is valid.

According to the test result using the Vertical-Fuller unit root test, it is shown that the level values of the data are not stationary with every three percent share (H_0: The series is not stationary, H_1: The series is stationary. Variables in the analysis: economic growth, oil and gas sector revenues, foreign investments and total. For the capital increase series, the fact that the t statistical values are less than the test critical values in absolute value at all the given significance levels indicates that these variables are not stationary in Azerbaijan.

Table 2 shows the quadratic differences and stationary states of the variables for the 21-year period in Azerbaijan ($P \leq 0.05$). In this table, the fact that the T statistical values are greater than the test critical values at the significance levels indicates that the data are stationary. Then, the VAR model was established using the variables and the appropriate lag numbers of these data were determined with the help of Akaike (AIC), LL, LR, FBE, SC and HQ information criteria. Appropriate lag lengths for this study are listed in Table 3. According to the lag length test result, the most appropriate lag length was determined as four, as can be seen from the table.

After the necessary tests were done, Granger analysis was performed to measure the causality relationship. The causality relationship between the Grangder results and the variables is given in Table 4. It is possible to interpret whether there is a causal

Table 1: Level values of series

Test critical values	GDP		Tourism revenues		Foreign direct investment		Capital formation	
	t-Statistics	Possibility	t-Statistics	Possibility	t-Statistics	Possibility	t-Statistics	Possibility
ADF testing statistics	–2.221847	0.2055	–2.227842	0.2032	0.366743	0.7808	–2.436537	0.1457
Test critical values								
1%	–3.831511		–3.808546		–2.685718		–3.831511	
5%	–3.029970		–3.020686		–1.959071		–3.029970	
10%	–2.655194		–2.650413		–1.607456		–2.655194	

Table 2: Second difference values of series

Test critical values	GDP		Tourism revenues		Foreign direct investment		Capital formation	
	t-Statistics	Possibility	t-Statistics	Possibility	t-Statistics	Possibility	t-Statistics	Possibility
ADF testing statistics	−3.928386	0.0092	–4.020071	0.0089	–6.856195	0.0000	–4.980644	0.0012
Test critical values								
1%	–3.886751		–3.959148		–3.857386		–3.886751	
5%	–3.052169		–3.081002		–3.040391		–3.052169	
10%	–2.666593		–2.681330		–2.660551		–2.666593	

Table 3: Appropriate delay length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-31.56892	NA	0.000772	4.184578	4.380629	4.204066
1	35.00849	93.99163	2.16e-06	−1.765704	−0.785453	−1.668266
2	64.19175	27.46660	6.88e-07	−3.316677	−1.552225	−3.141287
3	124.3735	28.32083*	1.64e-08*	−8.514530	−5.965878	−8.261189
4	1561.840	0.000000	NA	−175.7459*	−172.4130*	−175.4146*

*Indicates the appropriate lag length for the relevant test.

Table 4: Granger nedensellik testi

Hypotheses	F-value	Probability value (P)	Decision at 5% significance level
There is a causal relationship between economic growth and total capital increase.	3.855411	0.1455	Rejected
There is a causal relationship between economic growth and foreign investments.	7.802965	0.0202	Acceptable
There is a causal relationship between economic growth and revenues from the oil and gas sector.	2.768269	0.2505	Rejected
There is a causal relationship between total capital increase and economic growth.	4.358495	0.1131	Rejected
There is a causal relationship between total capital increase and foreign investments.	1.631736	0.4423	Rejected
There is a causal relationship between total capital increase and revenues from the oil and gas sector.	1.922303	0.3825	Rejected
There is a causal relationship between foreign investments and economic growth.	24.63979	0.0000	Acceptable
There is a causal relationship between foreign investments and total capital increase.	5.337602	0.0693	Rejected
There is a causal relationship between foreign investments and revenues from the total oil and gas sector.	18.35789	0.0001	Acceptable
There is a causal relationship between income from the oil and gas sector and economic growth.	2.267958	0.3218	Rejected
There is a causal relationship between the revenues from the oil and gas sector and the total capital increase.	7.630553	0.0220	Acceptable
There is a causal relationship between revenues from the oil and gas sector and foreign investments.	13.51719	0.0012	Acceptable

relationship between the variables according to the determined hypotheses and probability values.

Causality analysis was conducted to measure how effective the oil sector is in attracting foreign investment and increasing total capital in Azerbaijan, which is oil dependent. The obtained results reveal the relationship between the four variables. According to the Granger result, there is a bilateral causality relationship between foreign investments and economic growth in Azerbaijan. In this case, hypothesis H_1 is accepted ($P < 0.05$). In other words, while attracting foreign investments to the country supports economic growth, the realization of economic growth at the same time shows its own effect on the growth of the country's economy. In other words, these variables become the Granger cause of each other. A bilateral causality relationship was also found between foreign investments and income from the total oil and gas sector ($P < 0.05$). In other words, the arrival of foreign investors to the country and the increase in foreign currency inflows show their own effect on the increase in earnings from the oil sector. At the same time, the development of this sector makes the country more attractive for foreign investors. Increases in revenues in the oil and gas sector also have an impact on the overall capital increase in the country ($P < 0.05$). In other words, these variable capital increases are the Granger cause.

5. DISCUSSION AND CONCLUSION

FDI is known to have a positive and enormous impact on economic development for high-wage countries (De Mello, 1997). In the research on Azerbaijan, which is oil addicted, the causality relationship between the economic growth in this country, foreign

investments, total capital increases in the country and oil and gas sector revenues have been tried to be determined. A number of important results were obtained in the causality relationship measured using the Granger method. The data used in the analysis were obtained from the World Bank, an important data disclosure platform. The information obtained as a result of a 21-year process analysis really shows the importance of the oil and gas sector for this country in attracting foreign investments.

As a result of the study, there is a bidirectional causality relationship between economic growth and foreign investments in Azerbaijan. In other words, while attracting foreign investments to the country supports economic growth, the realization of economic growth at the same time shows its own effect on the growth of the country's economy. In other words, these variables become the Granger cause of each other. A bilateral causality relationship was also found between foreign investments and income from the total oil and gas sector ($P < 0.05$). In other words, the arrival of foreign investors to the country and the increase in foreign currency inflows show their own effect on the increase in earnings from the oil sector. At the same time, the development of this sector makes the country more attractive for foreign investors. Increases in revenues in the oil and gas sector also have an impact on the overall capital increase in the country ($P < 0.05$). In other words, these variable capital increases are the Granger cause.

FDI can not only increase the capital supply in the host country, but also increase the productivity of domestic firms through knowledge transfer (Nejati and Bahmani, 2020). In addition, as a result of the study, a bilateral causality relationship was found between foreign investments and the revenues from the total oil and gas sector. From this point of view, the increase in foreign currency inflows into the country can also improve the earnings from the oil sector in different sectors.

The oil and gas sector had improved the economic outlook for many countries around the world. The industry recognizes it as the main source of energy generation on the planet. After a period of falling crude oil prices, the oil and gas industry is considering redefining its boundaries through digitalization (Gezdur and Bhattacharjya, 2017). The development of the Internet and technology affects digitalization in the oil and natural gas sector as well as in different sectors. The workforce that provides the services needed by workers or employers meets in the labor market, where labor supply and demand meet. New digital labor markets claim to be flexible, lean and economical for both customers and independent contractors (Huseynli and Huseynli, 2022). In future studies, the relationship between foreign investments, especially oil and natural gas, and digitalization in the energy sector in general can be investigated.

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