

Czech University of Life Sciences Prague

Faculty of Economics and Management



Bachelor Thesis

**Statistical analysis of oil sector impact on the economy of
Kazakhstan**

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

Damira Kaiyrbek

Business Administration

Thesis title

Statistical analysis of oil sector impact on the economy of Kazakhstan

Objectives of thesis

The purpose of this thesis is to analyze dependency between oil industry and Kazakhstan's economy. In practical part, the dependency between oil sector and economic indicators like GDP, Inflation, and Unemployment is going to be identified. The thesis also aims to describe Kazakhstan's economy development after independence and to identify oil industry share in the economy and impact of resources on the performance of Kazakhstan. Based on the results of regression analysis improvements to the further economic growth will be proposed.

Methodology

Thesis goal is going to be achieved through theoretical and practical approach. Theoretical approach will be used to provide the overall background for the given topic and to discover factors that may have impact on economic situation of Kazakhstan and its relationship to the oil industry using various information sources such as academic journal, books, etc.

In the practical part, methods of time series analysis and methods of regression analysis will be used to evaluate the development of selected economic indicators and its relationship to the oil industry for given dataset.

The proposed extent of the thesis

30-40 pages

Keywords

economy, GDP, inflation, Kazakhstan, oil price, production, regression, unemployment

Recommended information sources

BP Statistical Review of World Energy 2020. London: British Petroleum, 2020.

FIELD, A. Discovering statistics using IBM SPSS Statistics. Thousand Oaks: SAGE Publications, 2013. ISBN 978-1-4462-4917-8.

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RAHARDJA, S., AGAIDAROV, A. Kazakhstan economic update : A slow recovery through the COVID-19 crisis , Washington, D.C. : World Bank Group, 2020.

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Declaration

I declare that I have worked on my bachelor thesis titled " Statistical analysis of oil sector impact on the economy of Kazakhstan" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15.03.2022

Kaiyrbek Damira

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I would like to thank my thesis supervisor Zuzana Pacáková for her advice and support. Also, I would like to thank my parents for their support throughout my studies.

Statistical analysis of oil sector impact on the economy of Kazakhstan

Abstract

The main aim of this thesis was to analyze the dependency between the oil sector and Kazakhstan's economy. In the theoretical part, the economic development of Kazakhstan was described and the economic background for further evaluation was provided. As the most important indicators oil price, inflation rate, unemployment rate, foreign direct investments were chosen.

In the practical part, the dependency between chosen indicators and the economic growth of Kazakhstan was stated. To assess the dependency SAS studio program was used. Oil price, inflation rate, unemployment rate, foreign direct investments were used as independent variables and GDP as the dependent variable. Results from the analysis were interpreted and the main regression model was constructed. Variables such as inflation rate, unemployment rate, foreign direct investments were excluded from the model because they were statistically not significant. It was found out that the oil sector has a strong impact on the economic development of Kazakhstan. Based on the results suggestions for further economic growth were suggested.

Keywords: economy, GDP, inflation, Kazakhstan, oil price, production, regression, unemployment rate, foreign direct investments.

Statistická analýza dopadu ropného sektoru na ekonomiku Kazachstánu

Abstrakt

Hlavním cílem této práce bylo analyzovat závislost mezi ropným sektorem a ekonomikou Kazachstánu. V teoretické části byl popsán ekonomický vývoj Kazachstánu a poskytnuto ekonomické zázemí pro další hodnocení. Jako nejdůležitější ukazatele byly zvoleny tyto ukazatele : cena ropy, míra inflace, míra nezaměstnanosti, přímé zahraniční investice.

V praktické části byla konstatována závislost mezi vybranými ukazateli a ekonomickým růstem Kazachstánu. K posouzení závislosti byl použit program SAS studio. Jako nezávislé proměnné byly použity ceny ropy, míra inflace, nezaměstnanost, přímé zahraniční investice a jako závislá proměnná HDP. Výsledky analýzy byly interpretovány a byl sestaven hlavní regresní model. Proměnné jako míra inflace, nezaměstnanost, přímé zahraniční investice byly z modelu vyloučeny, protože nebyly statisticky významné. Bylo zjištěno, že ropný sektor má silný dopad na ekonomický rozvoj Kazachstánu. Na základě výsledků byly navrženy doporučení pro další ekonomický růst.

Klíčová slova: ekonomika, HDP, inflace, Kazachstán, cena ropy, produkce, regrese, míra nezaměstnanosti, přímé zahraniční investice.

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1 Introduction

Well-being of the economy is one of the main indicators that shows the development of a country. Rapid economic growth depends on many factors. Therefore, each country has its way of economic growth. Kazakhstan is a relatively new country that appeared in a global arena in 1991. During its years of independence, the country had to build a completely new economic system.

The Republic of Kazakhstan has plenty of mineral resources, developed agricultural land, qualified personnel, and industrial deposits. Kazakhstan went through significant changes from the moment it emerged till nowadays. A strong and at the same time vulnerable link in the model of Kazakhstan is its raw material nature, which makes the economy dependent on world prices for raw materials, mainly oil.

From the perspective of explored oil and gas reserves, Kazakhstan ranks thirteenth in the world. Explored reserves of crude oil and condensate today amount to 2.76 billion tons. Kazakhstan accounts for 1.6% of global reserves of this type of fuel. The effective use of these potential opportunities is a prerequisite for the successful development of the Kazakhstani economy. Crude oil now takes the largest share of countries' export. Crude oil is used in almost all industries today. However, Kazakhstan was not always one of the biggest oil exporters.

In this bachelor thesis, economic indicators influencing economic development will be discussed, the economy of Kazakhstan after gaining independence will be described. The relationship between the crude oil industry's other economic indicators and Kazakhstan's GDP will be revealed

2 Objectives and Methodology

2.1 Objectives

The main goal of this thesis is to analyze the dependency between the oil industry and Kazakhstan's economic development. The aim will be accomplished through meeting the following steps:

- 1) Description of economic indicators describing the economy.
- 2) Explanation of economic development in Kazakhstan. Identifying oil industry share in the economy and impact of other economic indicators on the performance of the country.
- 3) Analyzing GDP, unemployment rate, inflation rate, oil price, foreign direct investments.
- 4) Assessing regression analysis results obtained through SAS studio. Finding statistically significant or statistically not significant variables based on the regression model, and evaluating the relationship between them.

2.2 Methodology

The theoretical part is focused on a review of the related literature. The overall background will be provided for the topic. Books, academic journals, scientific publications will be used to conduct a literature review.

The practical part includes analysis of four variables to understand the influence of them on GDP. GDP variable is used as dependent variable, as independent variables unemployment rate, inflation rate, oil prices, foreign direct investments were chosen. To achieve the aim of the thesis Microsoft Excel 2020 and SAS studio programs are used.

Multiple regression studies how a dependent variable Y is related two or more independent variables $x_1, x_2, x_3, \dots, x_p$.

Equation 1 Multiple regression model

Equation 1

$$Y = \alpha + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \dots + \beta_p \cdot x_p + \varepsilon \quad (1)$$

In the multiple regression model, $\alpha, \beta_1, \beta_2, \dots, \beta_p$ are the parameters of the equation, and ε is an error term. Evaluation of the model suggests that Y is a linear function

of x_1, x_2, \dots, x_p and an error term.

Estimated multiple regression equation

If the values of $\alpha, \beta_1, \beta_2, \dots, \beta_p$ were known, equation (1) could be used to calculate the mean value of Y at given values of x_1, x_2, \dots, x_p . But these parameter values are not, usually known and must be assessed from sample data. "A simple random sample is used to compute sample statistics a, b_1, b_2, \dots, b_p that are used as the point estimators of the parameters $\alpha, \beta_1, \beta_2, \dots, \beta_p$. These sample statistics provide the following estimated multiple regression equation. "

Estimated multiple regression equation

Equation 2

$$y_i' = a + b_1 \cdot x_1 + b_2 \cdot x_2 + \dots + b_p \cdot x_p \quad (2)$$

where: y_i' = estimated value of the dependent variable $a, b_1, b_2, \dots,$

b_p = estimated parameters

The OLS method

OLS method is applied for developing of the estimated multiple regression equation.

Least squares criterion

$$\sum_{i=1}^n (y_i - y_i')^2 \rightarrow \min$$

Where:

y_i = observed value of the dependent variable for the i th observation

y_i' = estimated value of the dependent variable for the i th observation

It shows that OLS method uses sample data to provide the values of a, b_1, b_2, \dots, b_p that make the sum of squared residuals a minimum.

Multiple coefficients of determination R^2 is used to evaluate the goodness of fit for the estimated multiple regression equation.

Hypothesis of t-test are: $H_0: \beta_i = 0, H_1: \beta_i \neq 0$

Statistical significance of not significance of variables is reached through the following steps:

When P-value is greater than alfa 0.05, then variable is statistically not significant

When P-value is less than alfa 0.05, then a variable is statistically significant

Multicollinearity in multiple regression analysis indicates the correlation among the

independent variables. Majority of independent variables in a multiple regression are correlated to some extent with one another. If correlation coefficient is greater than 0,8 it means that variables are highly correlated. Multicollinearity is not a problem for the data if it is r is less than 0,8.

3 Literature Review

3.1 GDP

3.1.1 Definition of GDP

There are various statistical indicators to measure the overall performance of a country's economy. One of the most important indicators among all of them is the gross domestic product. *“Gross domestic product (GDP) is a macroeconomic indicator that represents the market value of all final goods produced in a country by “residents” during a certain period (usually a year).”* (Shulimova, 2018)

Residents are not only the citizens of a selected country, but GDP also includes all economic units which are carrying out their economic activities within the country for at least a year. So, in defining GDP, the territorial principle is used, by which products are created. internal factors of production regardless of who they are actual owner – domestic or foreign. (Shulimova, 2018)

3.1.2 Calculation of GDP

GDP is defined as the sum of the final goods. The final product is a product that is purchased for final consumption, i.e., goods ready for sale or already sold. When calculating GDP, only the final product is considered.

The calculation of GDP does not include:

- an intermediate product. It is a product that is bought for its further processing or resale. Intermediate goods are not used for the calculation, so they will not be counted twice in GDP;
- the cost of goods and services produced by households for their consumption, the cost of goods produced by the population, if they are not intended for sale;
- products produced and sold in the shadow economy. As with households, the government has difficulties in acquiring data in this area of economic activity for estimating GDP.
- legally illegal activities (such as the production and sale of drugs);
- non-production transactions, which include purely financial transactions and the sale of used things.

It should be noted that purely financial transactions are:

- government transfer payments;
- private transfer payments - funds transferred from one private person to another free of charge;

Transactions with securities, which do not increase the production of products, but change only their ownership title.

Based on GDP, an analysis of the country's economic development is conducted. GDP also allows comparing the size of the economies of different countries for a specific period.

There are three methods of GDP calculation: income method, expenditure method, output method. (Shulimova, 2018)

1. Output Method

The output method is also referred to as the "net product" or "value-added" method. To properly calculate GDP, it is necessary to consider all products and services produced annually, and it is important to avoid double counting. Therefore, the definition of GDP only refers to the number of final goods and services produced. To eliminate double counting the indicator of added value is used, representing the difference between sales of companies of their manufactured goods and purchase of materials, instruments, fuel, energy, and services from another company. "Value added is the market value of a company's output, minus the value of the materials used, materials bought from suppliers. "

2. Expenditure method

The expenditure method results directly from the first method of determining GDP. GDP is defined as the valuation of the final products and services produced within a year; it is required to summarize all expenses of economic entities for the acquisition of the finished products. When calculation of GDP is based upon the expenditure, or the flow of goods (this method is also called a production method) these values are summed:

1. Household final consumption expenditure (C).
2. Gross private domestic investment in the national economy (Ig).
3. Government spending (G).
4. Net export (NX).

The formula sums up the expenditures to show the market estimate of yearly production:

Formula 3

$$GDP = C + I_g + G + NX \quad (3)$$

Household final consumption expenditure (C) includes the cost of purchasing durable goods, food products, clothing, household goods, and services.

Gross private domestic investment in the national economy (I_g), is the sum of the net investment (increase in the stock of capital goods such as buildings, equipment, machines, and inventories) and depreciation during the year.

Net investment indicates the process of real capital formation, not the purchase of financial assets like stocks, bonds, etc.

Government spending (G) is finances spent on acquiring goods and providing services, including education, healthcare, and social security. Transfer payments are not included in government expenditures. Transfer payments are payments of the state that are provided to people who are in need. It usually includes public benefits for poverty, unemployment, support for persons with disabilities. Transfer payments are not paid in exchange for services of any factor production, they are not considered as revenue.

Net exports (NX) are the difference between a country's exports and imports, most of the countries have open economies where the government does not prevent the free flow of goods, capital, labor within state borders. (Chepurina, Kiseleva, 2000)

3.2 Unemployment

3.2.1 Definition of unemployment

Another important indicator of countries' economics is unemployment. A low unemployment rate indicates usually stable economic development. A high unemployment rate refers to an unstable economic situation. However not every person is counted as unemployed. The person is called unemployed only when he is willing to get a job and can handle a job but for some reason cannot find a job. *“In real life that means to be considered as unemployed, a person must be an adult 16 years or older, not placed in specialized institutions (an example, not in jail), a civilian, and most importantly, this person must look for work”*. (Cowen, 2015)

3.2.2 Calculation of unemployment rate

There are three categories of the population over 16 years of age.

The first category is employed, individuals. It includes people who have a job, and those that have a job, but temporarily for some reason (illness, vacation) do not work.

The second category is unemployed. The unemployed group includes people who do not have a job but are actively searching for it. In the United States, an unemployed person is someone who for 4 months made active attempts to get new work.

The third category is persons who are not included in the labor force. It includes students, pupils, stay-at-home parents, and those who do not work for some personal reason. These people are considered an economically inactive part of the population.

The number of persons belonging to the first and second categories (employed and the unemployed) represents the total country's labor force. The unemployment rate is calculated as the ratio of the number of unemployed to the number of persons representing the labor force and expressed as a percentage:

Formula 4 Unemployment rate

$$U = \frac{\text{Unemployed People}}{\text{Labor Force}} \times 100\%$$

(4)

(Chepurina, Kiseleva, 2000)

3.2.3 Types of unemployment

There are three main types of unemployment.

The first type is called frictional unemployment. It is temporary unemployment when people are looking for a job or waiting for it. It occurs when they quit the previous one or when people are entering the labor market. It is not always easy to find a new job even when it is available. Lack of required information, a distance of the workplace from the place of living, and other varied factors lead to the fact that a person is searching for a job for some time. In some situations, people are forced to seek a new job. For instance, one of the spouses is transferred to work in another place, the whole family must move to another city or town. The second spouse is unemployed until he or she finds a suitable job. Frictional unemployment is characterized as voluntary and comparatively short-term. Frequently this type of unemployment impacts the people that have good professional skills, and a comparatively high probability of finding a new suitable job. (Chepurina,

Kiseleva, 2000)

The second type of unemployment is structural unemployment. *“Structural unemployment is unemployment that results because the number of jobs available in some labor markets is insufficient to provide a job for everyone who wants one.”* (Mankiw,2016).

Structural unemployment occurs in connection with technological shifts. Therefore, the demand for labor changes subsequently. People that for years were considered specialists in a specific area of work suddenly prove unnecessary, because production demands new qualifications, new specialists. This was the case with many factory workers when the handwork was replaced by machines. Commonly, this type of unemployment appears during the implementation of the results of the science and technology revolution in social production. Structural unemployment has a longer period of existence compared to frictional unemployment. While frictional unemployment can be considered voluntary, structural unemployment is viewed as forced. People who lost jobs due to structural shifts in social production tend to not have the skills necessary for a new profession. Acquiring skills that would satisfy the requirements of modern technologies is possible only after going through retraining, education. That is why, the elimination of structural unemployment is related to a lengthy period because of the time required for retraining and educating the unemployed in new, related professions. (Chepurina, Kiseleva, 2000)

Cyclical - unemployment that occurs because of a crisis, or recession, in production, i.e., that phase of the economic cycle, which is characterized by a strong decrease of total consumer and investment spending. As aggregate demand for goods and services decreases, employment decreases, consequently unemployment grows. Thus, cyclical unemployment is sometimes called unemployment associated with a lack of demand. (Nosova, 2017)

The combination of the frictional and structural types of unemployment forms the natural unemployment rate. This term is often called the "full employment rate" or "equilibrium unemployment". The natural unemployment rate determines the level of potential GDP.

3.3 Inflation

3.3.1 Definition of inflation

Inflation is a general and ongoing rise in the level of prices in an entire economy. Inflation means that there is pressure for prices to rise in most markets in the economy. In addition, price increases in the supply-and-demand model were one-time events, representing a shift from a previous equilibrium to a new one. Inflation implies an ongoing rise in prices. If inflation happened for one year and then stopped, then it would not be inflation anymore.

The following inflationary reasons cause price increases:

1. The deficit of the state budget, which is financed by emission.
2. Financing of investments through emission. Particularly inflationary are investments intended for militarizing the economy. Military appropriations make additional demand without proper commodity coverage.
3. Change in the market structure, which is characterized as an imperfect market competition with a predominance of oligopoly. Oligopolies, exercising control over the price, can manipulate the volume of production depending on the conjuncture.
4. "Import" of inflation – an increase in the prices of imported goods.
5. Inflation expectations.

In all countries, inflation is due to varied reasons. So, the importance of each of the factors is determined by specific circumstances. (Shulimova, 2018)

3.3.2 Calculation of inflation

In Kazakhstan (as well as in most economically developed countries) the main indicator used to estimate inflation is the consumer price index.

The consumer price index (CPI) is the ratio of the value of a representative basket of goods and services of a fixed composition of the current period to the baseline. Fixation of the composition of the commodity structure allows to evaluate purely price changes.

The CPI is usually assessed monthly. To calculate it a basket of consumer goods and services consisting of 344 types of goods and services is used. This basket consists of 3 main groups: food products, non-food products, and paid services for the population.

The most accurate indicator is the monthly CPI. As a result, the CPI is a composite indicator that sums up all price changes in goods and services in the consumer basket, rising

prices for certain goods may be offset by a change (decrease) in prices for other goods.

Based on the monthly CPI, the annual CPI is calculated, which is an indicator of inflation for the year. There are 2 ways to measure the annual inflation

- at the end of the year and the average annual:

- Inflation measured at the end of the year is determined by the CPI, calculated based on a comparison of the cost of the basket of goods and services formed at the end of the periods, i.e., in December.

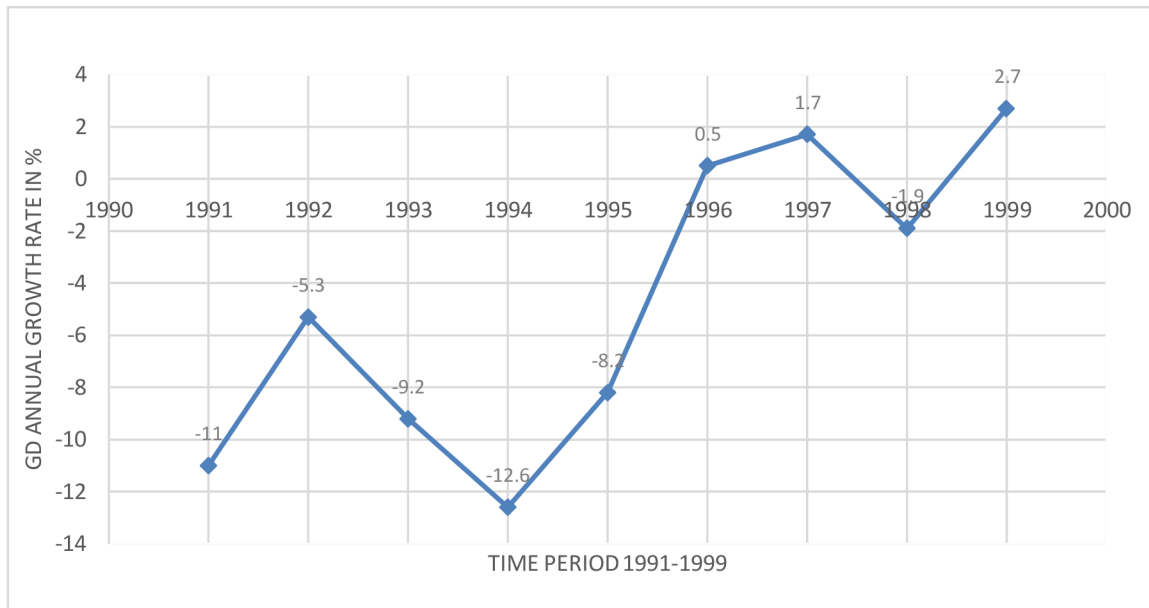
- The average annual inflation is determined by the CPI, calculated based on a comparison of the value of the basket of goods and services observed during the entire period, that is, from January to December. (NB, 2001)

3.4 Development of the economy of Kazakhstan from 1991 till 2000

The overall economic and political situation of the USSR (the Union of Soviet Socialist Republics) in 1891-1991 was critical. The total decline of the USSR economy in the 1986 and early 1990s exceeded 50%. The programs of Ryzhkov-Abalkin, Yavlinsky's "500 Days", Gorbachev that were supposed to save the economy were unsuccessful. Ineffective governance and a weak economy led to the inevitable collapse of the Soviet Union.

Kazakhstan became an independent country on 16 December 1991. The country had huge crude oil reserves, uranium, gold, chrome, and many other natural resources within plenty of farms, pastures. However, within the first years of independence government did not use to the full extent those resources. The economic situation of the newly independent country was quite difficult. From 1992 to 1999 GDP annual growth rate was primarily negative. As it can be seen from figure 3.4 GDP annual growth rate ranged from -12.6% to -1.9%.

Figure 1 GDP annual growth rate (1991–2000)



Source: www.worldbank.org

Kazakhstan was tightly connected to the economies of former USSR countries, especially to Russia. From 1990 to 1994 in Kazakhstan, the volume of industrial production halved, agricultural sector production fell three times, transportation fell by two-thirds. A strong decline in demand for the products of Kazakhstani firms (mostly heavy industry) caused inflation in Kazakhstan that was about 2000-3000%. As well as an increase in the unemployment rate to 13%. There was a failure of the former administrative command system of economic management. Therefore, the new government had to make economic reforms and transfer from central planning to the open market economy in a very short time. The sector of production relations required an immediate reorganization. The first step was to start the process of changing from the government ownership of the factories and buildings to individual ownership. President of Kazakhstan N. Nazarbayev in 1992 announced a course of denationalization and privatization. Simultaneously with these processes, reforms were conducted in the field of taxation, pricing, wages, and banking policy. (Aiaganov, 2010)

The privatization process consisted of three stages. During phase 1 (1991-1992) 6.2 thousand enterprises were owned by citizens. In phase 2 (1993-1995) 10,765 small companies were sold. By the end of phase 3 (1996-1998), 34.5 thousand companies were sold to private owners. (Jermakowicz, 1996)

The privatization process itself was quite painful, as it took place in conditions of tight monetary policy, and inefficient enterprises were deprived of governmental financial

subsidies. As most of the former USSR countries, Kazakhstan used the ruble as a currency. However, on 15 November 1993 after the collapse of the 'ruble zone', the new currency "tenge" was introduced. Businesses already were in a difficult position with a debt of about 260 billion rubles. Subsequently, entering a new policy did not help the situation. (Celetti, 2019)

In 1993 government concluded that it is not possible to continue the privatization process without the foreign investors who could save the enterprises that were almost bankrupted.

In November 1993 Kazakhstan allowed foreigners to purchase some stocks of large companies. According to R. Pomfret, one of the first investors were: "*Philip Morris that purchased a 49% share in the Almaty Tobacco Factory for \$313 million. RJR Nabisco purchased 90% of the Shymkent Confectionery Factory for \$70 million. Unilever purchased 90% of the Almaty and Karaganda Margarine Plants for \$60 million. In 1994 and 1995 the State Property Committee earmarked other large enterprises for sale.*" (Pomfret, 2005)

Kazakhstan implemented the first law on Foreign Investment in 1994. The national law was designed to cover all investment activities, it ensured equal treatment both for foreign investors and citizens of the country. The policy made for investment in the main sectors of production gave a meaningful positive effect. In the period from 1993 to 1999 country received \$9.29 billion from overseas investors, 53% of the total amount was obtained by the oil and gas industry. Another part of the remaining funds went to steel, non-ferrous metallurgy, energy manufacture, and various other areas. The quantity of foreign direct investments was already equal to \$1.36 billion. while 84% went to the oil and gas industries and 4% to the metallurgical industry. (Brill, 2003)

Throughout the 1990s, the agricultural sector in Kazakhstan underwent significant changes in the form of ownership. The share of individual proprietors in the structure of agricultural production went from 40% in 1991 to 99% in 2003. Therefore, the transfer of ownership was almost completed and the results of the reform of collective farms boosted a number of economic entities by 11 times. Overall, the three stages of privatization were quite helpful to Kazakhstan's economic situation. In 1996-1997 privatization proceeds were already about 20-30% of the budget revenue. (Aiaganov, 2010) GDP sector shares of agriculture in 1997 was 13,4%, industry 30,5%, services 51,6%. (Dowling, 2006)

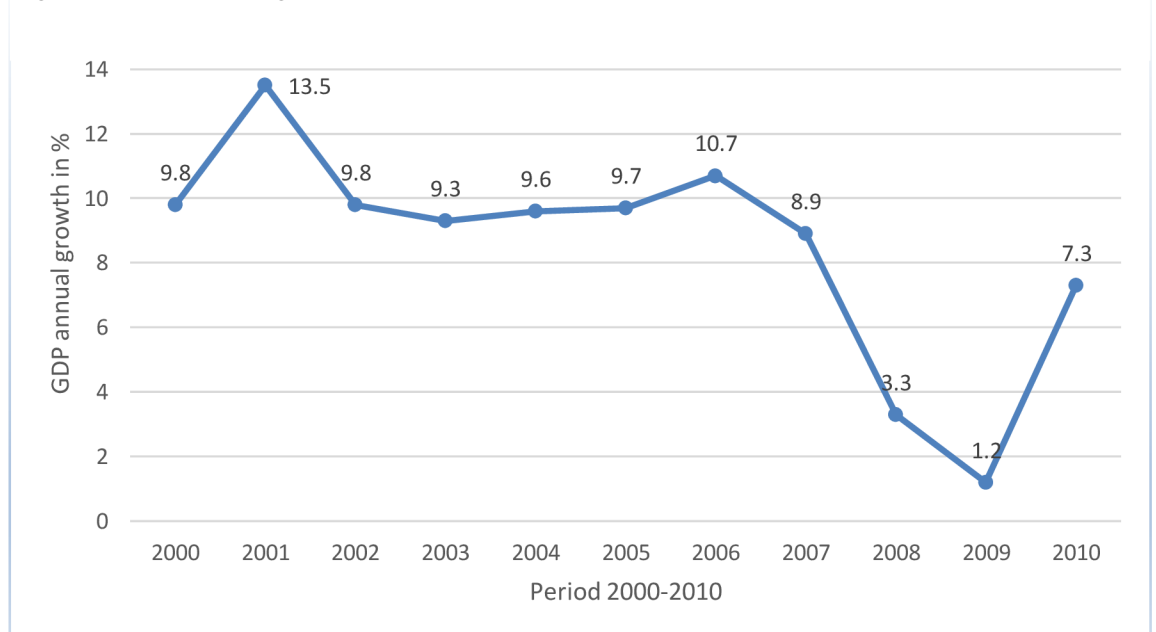
By 1996, inflation had finally come under control. Consumer price increases fell from an annual average of 1,892% in 1994 to 39.1% in 1996, and 17.4% in 1997.

However, the positive trend of economic growth has been substantially slowed by the global economic crisis which happened in South-East Asia. The crisis that began in 1997 reached Kazakhstan in 1998 hitting the economics which just started to develop. One of the main measures taken by the government was: firstly, the realization of pension reform; secondly, enhancement of denationalization and state property administration processes; thirdly, implementation of reforms to support local producers; also, the National Fund of the Republic of Kazakhstan was created, which could help the economy in case a fiscal crisis occurs. Those measures helped Kazakhstan to overcome the 1998 crisis. After 1999 country stepped on the way of further economic development. (Bekmagambetova, 2018)

Concluding the first independent decade Kazakhstan’s economy had an exceptional transformation process. Kazakhstan made a transition from the central planning economy to the market economy in a difficult condition. Though, despite some losses at the end of 1990, the economic situation gradually becomes stable. GDP indicator of the country started to overcome the negative trend and from -12.6% growth rate in 1994 it dropped to 2.7% in 1999

3.5 Development of the economy of Kazkhstan from 2000 till 2010

Figure 2 GDP annual growth rate



Source: www.worldbank.org

The period from 2000-to 2010 is associated with quick economic development in Kazakhstan. GDP conquered the negative trend of the 1990s and became positive. As it is

seen from the figure 2 until the world crisis of 2008 GDP annual growth was around 10%. In 2008 and 2009 GDP was moderately low but it started its growth again in 2010.

Economic growth in Kazakhstan was pushed with oil and natural gas investments, proper macroeconomic decisions of the government, and investments in the transportation sphere. Also, special attention was paid to the economic diversification sectors of food processing, machinery, oil refining, and chemicals that demonstrated a great increase. Manufacturing sphere produced from 1998- 2003 more on 10% every year. In 2003 republic already had the greatest manufacturing base among Central Asia countries. Exports have primarily consisted of iron, steel, chemicals and plastics, machinery, and transport equipment. (Dowling, 2006)

The growth of the country's economy was facilitated by the investors. In the 2000s Kazakhstan became the leader in foreign direct investments among Central Asian countries. From \$2.78 billion in 2000 total sum of overseas investments increased to \$22.4 billion in 2010.

Social protection measures, along with the strategies designed for reducing the unemployment level in Kazakhstan, resulted in a decrease in the segment of the residents with income below the subsistence minimum. “Consequently, in 2006, the share of the population with an income below the subsistence minimum was 18.2% (in 1996 - 34.6%). The unemployment rate among the able-bodied population also decreased from 13% in 1995 to 7.7% in the first quarter of 2007.” (Sultanov, 2008)

In the middle of the 2000s, the number of exported products over imported agricultural products was equal to 35%. Therefore, Kazakhstan was able to ensure the country was supplied with food in case of emergency. In 2003-2005 the agricultural sector went through a crisis, and it can be surely said that it came to the normal functioning. In Kazakhstan's manufacturing industry, mining sustained a leading role, 60% of the whole industrial segment was occupied by it. Production of oil and gas in the industrial sector took about 80%. Among the central Asian countries, Kazakhstan was in second place in oil production. Simultaneously, the development of 110 oil and gas and oil and gas condensate fields continued. Approximately 34 companies worked in the oil production sector constantly producing bigger amounts of products. In 1991 Kazakhstan produced about 20 million tons of oil and gas condensate, in 2005 amount of production was 4 times bigger 61 million tons. From that amount, 54 million tons were exported to other countries. One of the most important industries of the republic was oil refining which took 5% of GDP.

Refining enterprises were allocated in the next areas in South Kazakhstan (43% of

volume), Atyrau (28%), Pavlodar (25%). These enterprises produced diesel and boiler fuel, aviation kerosene, motor gasoline, petroleum bitumen, and other petroleum products. In 2000-2003, the growth in the production of petroleum products in Kazakhstan was almost 8.7%. In 2005, the volume of production of gasoline was 22%, diesel fuel 27%, fuel oil 31%. In the meantime, the oil and gas industry gave 25% of budget investments less than the non-ferrous and ferrous metallurgy of Kazakhstan. Hence, during the period from 2000 to 2007, the country's economy had significant development, used new opportunities, and then achieved various levels of steady growth. (Aiaganov, 2010)

Due to the economic growth population living below the poverty line decreased from 44.5% in 2002 to 12% in 2007. The unemployment rate dropped from approximately 13 percent in 2000 to 7 percent in 2007. Governmental fiscal policy was aimed at keeping the overall expenditure level fixed at 22% of GDP. This measure helped to collect substantial reserves in the national oil fund, which was \$27 billion by 2008. Those savings in the national fund were targeted at avoiding excessive appreciation of the exchange rate. This goal was accomplished in 2001–2005 when the exchange rate increased only by 2 percent. However, in 2006–2008 exchange rate appreciated by 18 percent. Unfortunately, the economic crisis in 2008-2009 hit the economic growth of Kazakhstan. The price of oil on which the economy strongly relied declined and the export revenues dropped as well. But Kazakhstan's fiscal management helped to overcome this crisis. "The government was then able to implement a fiscal stimulus program of \$21 billion to bail out the failing banking sector, to support the recovery of other economic sectors, and to safeguard critical social benefits. The government's anti-crisis program has been evaluated by the International Monetary Fund (IMF) and the World Bank and viewed as a well-designed and successful case compared with those of other countries." (Aitzhanova, 2015)

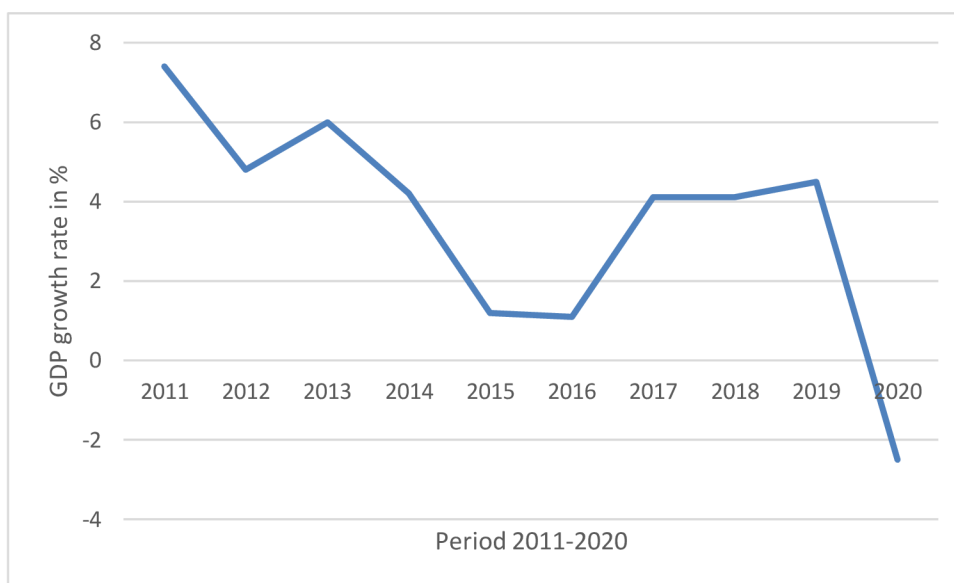
3.6 Development of the economy of Kazakhstan from 2010 till 2020

3.7

After the world global crisis in 2008, the world economy began to recover and the increase in external demand led to the start of the positive changes in the economy of Kazakhstan. The growth of domestic demand in 2010 was facilitated by a 25% increase in wages, social benefits, and pensions from the budget. The growth of business activity in the sectors of the economy was stimulated by anti-crisis procedures of the government, the application of which continued in 2010. Also, economic growth is associated with the beginning of the new state program for "industrial innovative development of the country's economy for 2010-2014 years". As a result, the volume of GDP in January-December 2010

reached 21.5 trillion tenges, and the GDP growth rate compared to 2009 when it was at the level of 5.8% has accelerated significantly and reached 7.0% in 2010. For 2010, all components of GDP showed decent growth rates. The maximum growth rate was shown by the manufacturing industry, which grew by 18.4%. The economically active population in 2010 amounted to 8.6 million people, which is more on 1.8% than in 2009. The number of employed people increased by 2.7% to 8.1 million people. The number of unemployed decreased by 10.4% to 496.6 thousand people. (NBK, 2010) In 2011 GDP increased by 7.4% as it is indicated in figure 3.

Figure 3 GDP annual growth rate in % (2011-2020)



Source: www.worldbank.org

There was a decrease in investments in 2010 by 0.5%, in the next three years, investment showed a positive growth trend. In 2011, the volume of foreign direct investments increased by 2.4%, in 2012 the growth reached 3.8%, and in 2013 the growth accelerated to 6.5%. There was a decrease in investment in the mining industry for two years and in 2013 showed growth. In 2011, the volume of investments decreased by 7.8%, in 2012 decreased by 5.8%, in 2013 it showed growth by 9.0%, as a result, the share of the mining industry in the total investment increased to 31.8% compared to 31.3% in 2011. Official exports of goods fell by 4.6% to \$82.5 billion, of which \$55.2 billion (or 66.9%) accounted for oil and gas condensate exports. The average world price of Brent crude oil for 2013 was \$108.9 per barrel, less by 2.8% compared to 2012.

In 2013, economic growth was pushed by the development of the manufacturing

industry, as well as in the communications, trade, and agriculture sectors. The improvement of indicators was facilitated by the growth of food production by 4.2% and the production of coke and refined petroleum products by 1.5% in the manufacturing industry, as well as a growth in indicators in the crop production sector by 22.5% in agriculture. Thus, according to the National Bank of the Kazakhstan data, in 2013 the gross domestic product of Kazakhstan was about 33.5 trillion tenge, which is more in comparison with 2012 by 6.0% (in 2012 the growth was 5.0%). At the end of 2013, inflation amounted to 4.8%, the annual inflation rate for 2013 was the lowest since 1999. (NBK, 2013)

During 2014, there was high volatility in the international commodity and financial markets. In the autumn of 2014, international organizations lowered forecasts for global growth and global demand for fuel. It was followed by a decline in the cost of oil, which only in one year reached 50%. In 2015, the average annual prices for Brent crude oil decreased by 47%, for copper - by 20%, for steel - by 12%, for wheat - by 15%. In 2015, the economy of Kazakhstan, as in 2014, developed in the context of growing geopolitical tensions, the deterioration of foreign economic conditions, and the decline in world prices for oil and metals. As a result, under the influence of external and partly internal reasons, economic activity in the country slowed down, remaining, however, on a positive growth trajectory. In 2015 Kazakhstan's GDP grew in real terms by 1.2% (in 2014 - by 4.1%), reaching 40.8 trillion at current prices tenge. (NBK, 2015)

Those changes forced the government of Kazakhstan on August 20, 2015, to release the national currency into free float. The artificially restrained dollar exchange rate in one day jumped from 188.38 to 255.26 tenge. So, crude oil prices also have a direct effect on another economic indicator such as the currency rate of tenge which drops right after the oil price.

In 2017 oil prices increased again and income per capita in Kazakhstan increased from \$7,500 in 2016 to \$8,841. The amount of foreign direct investment also showed growth more than tenfold from \$10.1 billion to \$129.2 billion between 2010 and 2014 and remained stable even during the crisis. However, this impressive increase is based largely on the exploration and sale of fossil raw materials and the service infrastructure built around them. In the period before the crisis in 2014, the share of the already weak industrial sector in GDP fell from 40.5% to 36%, and the share of agriculture in GDP (from 8.7% of GDP to 4.7%) fell by almost half. After economic growth, a stable 4.0% was again achieved in 2017. For a country with a transition economy, this is solid, but not high rates.

This again underlines the need for economic transformation, away from a one-sided resource-dependent economy, to have new growth opportunities. (Nurlan Baygabylov, 2019)

In 2019, inflation was at the level of 5.4%. In 2019, GDP growth, according to the Committee on Statistics the Ministry of National Economy of the Republic of Kazakhstan amounted to 4.5%. Growth was observed in all main sectors of the economy, while trade had the largest contribution to GDP growth 1.2% out of 4.5%, industry 1.1%, and construction 0.7% compared to 2018. (NBK, 2019)

The world crisis connected with the COVID-19 was one the most difficult year for Kazakhstan's economy in the last 20 years. The pandemic hit the economy more than the financial crises in 2008-2009 and 2014-2015. The spread of the COVID-19 pandemic stopped worldwide activity in the second quarter of 2020. Consequently, the need for oil declined drastically. Overall demand was reduced, and the oil price dropped that is Kazakhstan's main export product. In April 2020, the average oil price fell to \$21 for a barrel, the lowest price in the last two decades. The COVID-19 also decreased domestic economic activities, with GDP shrinking by 2.8 percent over January-September 2020, contrasted to a 4.1 percent increase in the same period last year. (Rahardja, 2020)

4 Practical part

4.1 Discussion of variables

The main objective of the thesis is to identify the relationship between the oil industry and Kazakhstan's economy. Thus, the oil price and GDP of Kazakhstan variables were chosen to identify their relationship.

GDP is one of the most common indicators reflecting the economic situation of countries around the world. The price of oil is essential for the growth of countries' GDP that specializes in the export of oil. It comes from the development of relationships between oil prices and the global economy because of the rapid growth of the social economy. Typically, an increase in oil prices leads to the growth of the global economy. Consequently, the oil price is strongly associated with the sustainable development of the worldwide economy. Fluctuations in prices might have a substantial positive or negative impact on its profitability as time goes. (Mughtarov, Humbatova, 2021)

However, it is reasonable to include variables that are known as common factors of GDP changes. This could allow isolating the effect of oil price on GDP. Three other variables were chosen, such as inflation, unemployment, foreign direct investments.

Inflation does not help the fast economic growth of a country. High inflation rates certainly do not lead to higher levels of revenue in the medium and long run. Inflation does not simply decrease the level of business investment but also reduces the effectiveness with which productive factors are utilized. High inflation rates lead to a lower rate of GDP growth. (Dijest, 1997)

Normally, the economic growth slowdown is followed by rising unemployment. The inverse correlation between GDP growth and unemployment is known as "Okun's law," when the economist Arthur Okun first recorded it at the beginning of the 1960s. It includes two crucial macroeconomic variables. Furthermore, the relationship has empirical support. However, Okun's law is a statistical relationship rather than a structural feature of the economy. As with any statistical relationship, it may be subject to revisions in an ever-changing macroeconomy. (Knotek, 2007)

Foreign direct investment is one of the important directions of economic development of states at the present stage. The high amount of FDI will allow reaching a new level of economic development, which will open great prospects that form new competitive advantages and wide opportunities in today's globalized world. In the post-crisis period, sovereign wealth funds should become one of the main tools for attracting FDI in the countries. The inflow of long-term capital investments from private equity funds

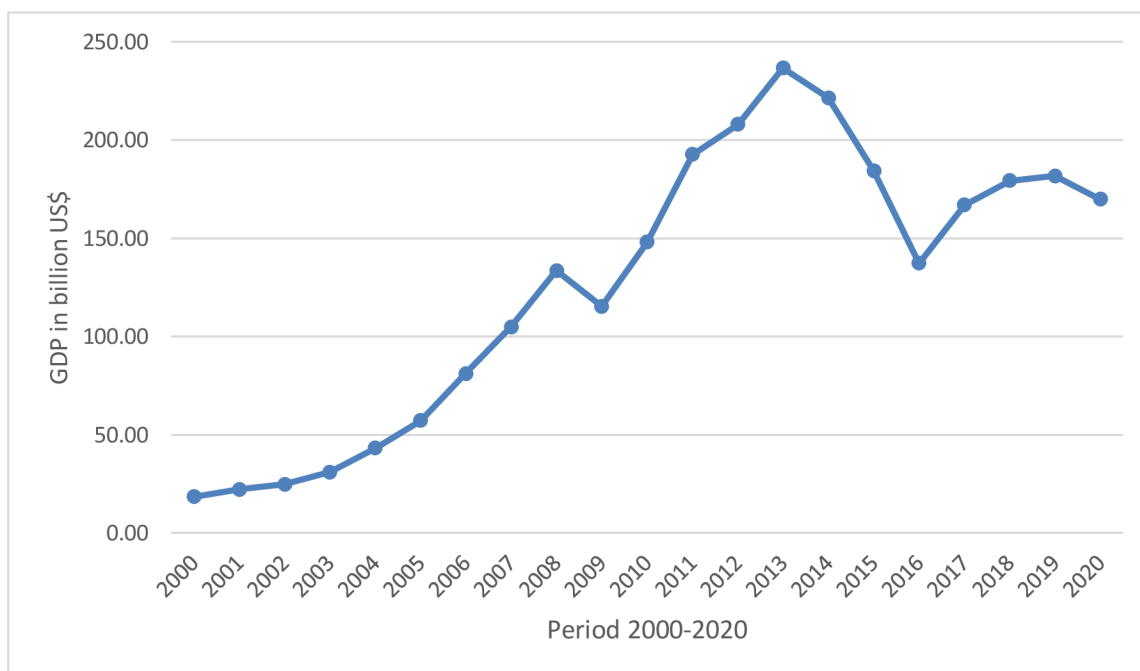
by the recipient country will contribute to accelerating GDP growth, improving the well-being of the population and the investment climate. (Mamedov,2020)

4.2 Descriptive analysis of variables

4.2.1 GDP

The period from 2000-to 2013 is associated with fast economic growth in Kazakhstan. GDP overcame the negative trend of the 1990s and became positive. From \$18.29 billion at the beginning of 2000, which is the minimum during 20 years' time series. Up to the 2008 world economic crisis, the annual GDP growth was quite high. In 2008 and 2009 GDP was moderately low. The decline of GDP was caused by a decrease in oil prices. GDP began its growth again in 2010. GDP reached its maximum of \$236.63 billion in 2013. From 2017 till 2019 GDP demonstrated economic growth, however, it was slowed down by the beginning of the COVID-19 pandemic. GDP reached \$169.84 billion in 2020 as it is indicated in graph 1.

Graph 1 GDP



Source: worldbank.org

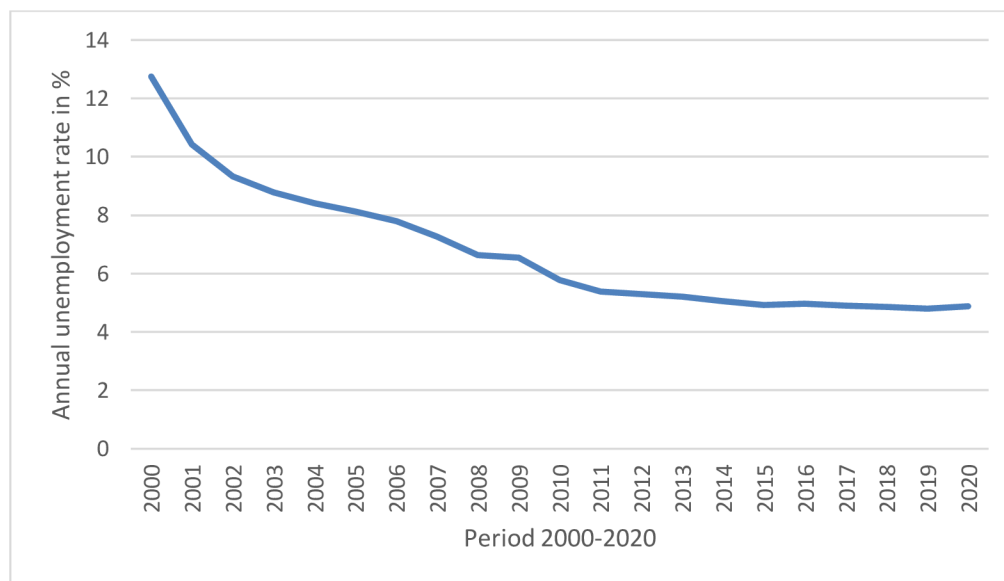
4.2.2 Unemployment rate

In Kazakhstan, the unemployment rate was quite high at the beginning of 2000. Then the unemployment rate was progressively decreasing till 2009. The value decreased by 7%.

A slight increase in 2009 was caused by the world economic crisis. From 2009 the rate decline was slowed down considerably. It decreased by approximately 1% in 10 years. The unemployment rate went down from 5.77 in 2010 to 4.89 in 2020. The overall trend is downward.

Based on the information from the graph the maximum annual unemployment rate was 12.75% in 2000, and the minimum was 4.8% in 2019.

Graph 2 Annual unemployment rate

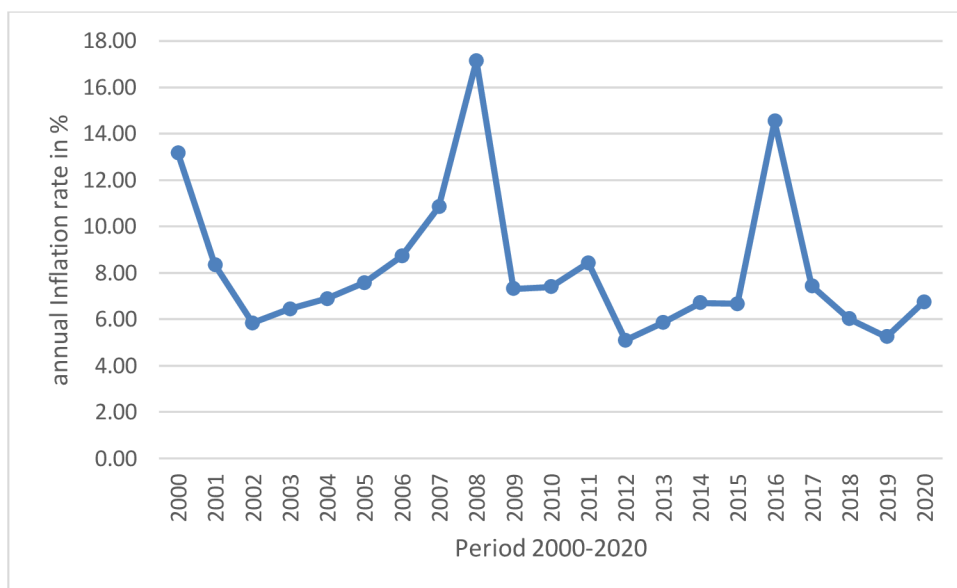


Source: worldbank.org

4.2.3 Inflation rate

The level of inflation rate fluctuated a lot during the last 20 years in Kazakhstan. From 2000 till 2002 inflation rate declined significantly by 7%. But, in 2003 inflation rate increased by 10% reaching a peak in 2008. The maximum annual inflation rate was in 2008 equal to 17.14%. In 2009 it dropped to 7.32%. In 2012 it declined to 5.1% which was the lowest value in 20 years. The inflation rate increased again peaking in 2016 with a rate of about 14.55% because the national currency was released to the free float. After that inflation rate stabilized with a slight increase in 2020 due to the COVID-19 crisis.

Graph 3 Annual inflation rate

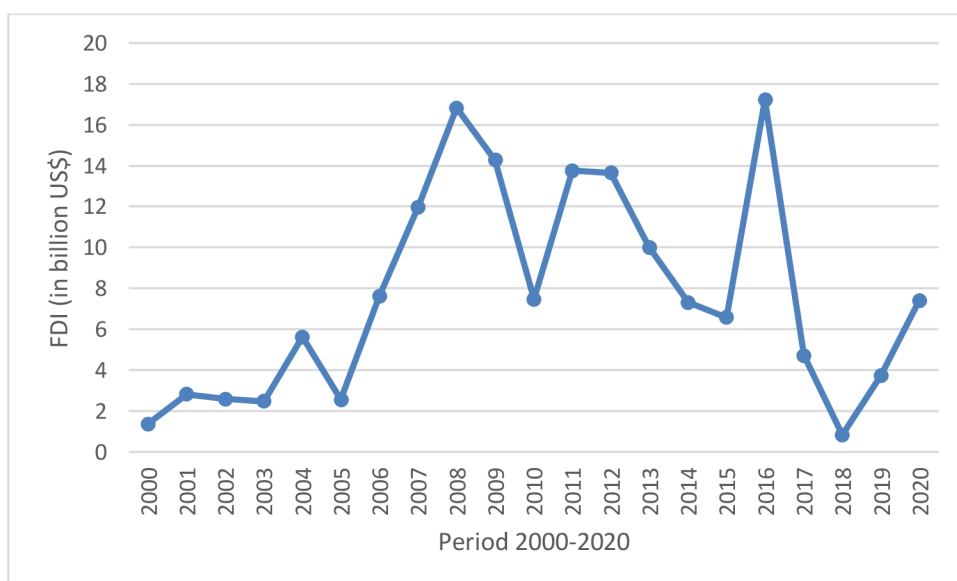


Source: nationalbank.kz

4.2.4 FDI

From 2000 till 2020 Kazakhstan became the most invested country in Central Asia. In 2000 FDI was \$2.78 billion with a gradual following growth. In 2004 it was \$8.13 billion with a decrease in the next year. From 2006 till 2008 investments volume reached \$19,41 billion. The graph 4 indicates a slight decrease in 2009 by \$130 million. Investments reached their maximum in 2012 with \$28.85 billion afterward the amount decreased to \$15.4 billion. From 2016 to 2018 there was growth in investments. In 2019 small decline of \$200 million emerged. In 2020 investments declined to \$17.1 billion.

Graph 4 FDI

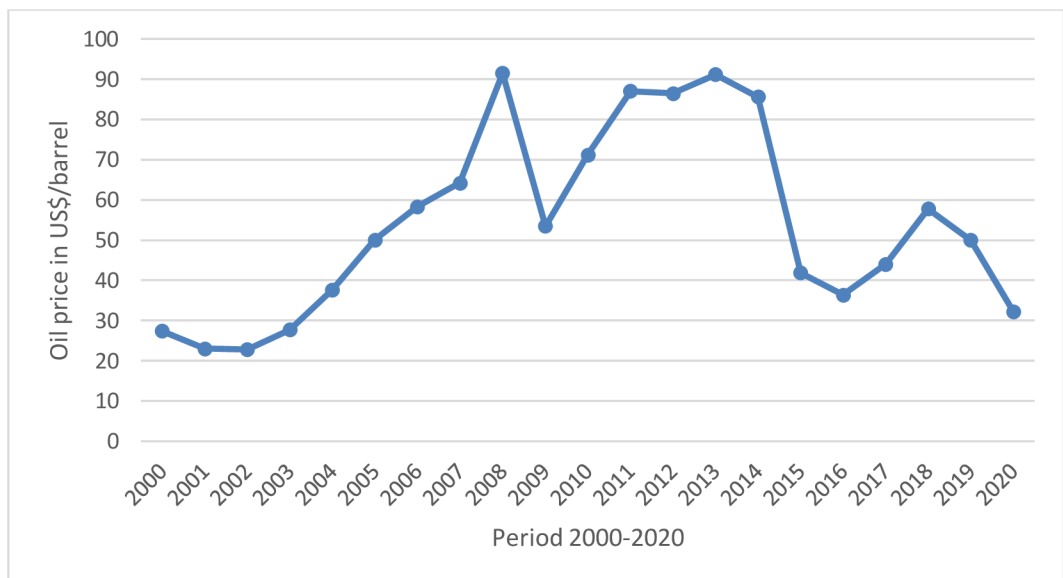


Source: nationalbank.kz

4.2.5 Oil price

From the graph 5, it can be seen that there is no trend. The price of oil fluctuated a lot during 20 years period. From 2000 till 2002 the price decreased by approximately 5\$. In 2002 oil price reached its minimum with \$22.81. From 2003-2008 price gradually increased. In 2008 it reached the maximum of \$91.48 with a significant drop in 2009. Price dropped to \$53.48. Then price increased during next years reaching almost the maximum of 2008 in 2013 with a price of \$91.17. From 2014 till 2016 price decreased to \$36.34. 2017-2018 was followed by an increase to \$57.77. The next two years were followed with oil price decrease. In 2020 oil price decreased to \$32.25.

Graph 5 Oil price



Source: inflationdata.com

4.3 Economic model and data

Table 1 contains annual time series data about GDP, annual inflation rate, annual unemployment rate, oil prices, and foreign direct investment data from 2000 to 2020. The economic model is built based on the data from the table.

Table 1

Year	Oil Prices, USD/Barrel	GDP, billion USD	Inflation, %	Unemployment Rate, %	FDI, billion USD
2000	27,39	18,29	13,18	12,75	2,78
2001	23,00	22,15	8,35	10,43	4,56
2002	22,81	24,64	5,84	9,33	4,10
2003	27,69	30,83	6,44	8,78	4,62
2004	37,66	43,15	6,88	8,40	8,13
2005	50,04	57,12	7,58	8,13	7,91
2006	58,30	81,00	8,72	7,79	12,06
2007	64,20	104,85	10,85	7,26	19,41
2008	91,48	133,44	17,14	6,63	21,30
2009	53,48	115,31	7,32	6,55	21,43
2010	71,21	148,05	7,40	5,77	22,24
2011	87,04	192,63	8,42	5,39	26,46
2012	86,46	208,00	5,10	5,29	28,85
2013	91,17	236,63	5,85	5,20	24,09
2014	85,60	221,42	6,71	5,06	23,80
2015	41,85	184,39	6,67	4,93	15,37
2016	36,34	137,28	14,55	4,96	21,36
2017	43,97	166,81	7,44	4,90	20,96
2018	57,77	179,34	6,02	4,85	24,26
2019	50,01	181,67	5,25	4,80	24,11
2020	32,25	169,84	6,75	4,89	17,10

To find out whether variables are statistically significant or statistically not significant following economic model is built: “The GDP of Kazakhstan is influenced by the annual inflation rate, annual unemployment rate, oil prices, and foreign direct investment”.

The first model in mathematical notation is given as:

$$GDP = f(OIL\ PRICES, INFLATION, UNEMPLOYMENT, FDI\ PRICES, FDI)$$

4.4 Regression model estimation

The economic model from chapter 4.3 will be used to build the regression model. The estimation of the regression model must give an understanding of the relationships between the dependent variable (GDP) and independent variable (annual inflation rate, annual unemployment rate, oil prices, and foreign direct investment). The regression model is down below:

$$y_t = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + \beta_3 x_{3t} + \beta_4 x_{4t} + \varepsilon_t$$

y_t – GDP (in billion USD)

x_{1t} – Oil price (in USD/barrel)

x_{2t} – Inflation rate (in percentages)

x_{3t} – Unemployment rate (in percentages)

x_{4t} – Foreign direct investments (in billion USD)

ε_t – error term

t – time;

4.4.1 Multicollinearity analysis

Before making the final estimation of the regression model multicollinearity should be tested between independent variables. In SAS studio correlation analysis was chosen to assess multicollinearity between oil prices, inflation rate, unemployment rate, FDI variables. As it can be seen from Table 2 FDI and unemployment variables are highly correlated. $r_{x3t x4t} = 0.86597$. However, this multicollinearity should be tested in order to know if correlation is valid.

Table 2

Pearson Correlation Coefficients, N = 21				
	Oil Prices, USD/Barrel	Inflation, %	Unemployment Rate, %	FDI, billion USD
Oil Prices, USD/Barrel Oil Prices, USD/Barrel	1.00000	0.05316	-0.52283	0.76375
Inflation, % Inflation, %	0.05316	1.00000	0.25312	-0.07597
Unemployment Rate, % Unemployment Rate, %	-0.52283	0.25312	1.00000	-0.86597
FDI, billion USD FDI, billion USD	0.76375	-0.07597	-0.86597	1.00000

Source: own calculation

So, multicollinearity of FDI and unemployment variables was tested on residuals that for time series were smoothed by linear trend function and quadratic function. As it can be seen from table 3 correlation between variables $r_{x_3t \ x_4t} = 0.08866$. The value is very low therefore there is no multicollinearity between variables and all variables can be used for the regression model estimation.

Table 3

Pearson Correlation Coefficients, N = 21				
	OilPricesUSDBarrel	Inflation	RES_unemploy	RES_FDI
OilPricesUSDBarrel OilPricesUSDBarrel	1.00000	0.05316	-0.62755	0.41385
Inflation Inflation	0.05316	1.00000	0.11663	0.14095
RES_unemploy RES_unemploy	-0.62755	0.11663	1.00000	0.08866
RES_FDI RES_FDI	0.41385	0.14095	0.08866	1.00000

Source: own calculation

4.4.2 First regression model

The regression analysis aims to determine which variables are statistically significant, if the variable is not significant it will be excluded from the final model. To make the first model linear regression task was chosen in the SAS studio, and annual time-series data from Table 1 was used. GDP was selected as the dependent variable, and other variables such as oil price, inflation rate, unemployment rate, FDI were selected to be independent variables. The first model:

Regression model 1

$$\hat{y}_t = -68.88823 + 1.59726x_{1t} - 2.67645x_{2t} + 4.31503x_{3t} + 0.24661x_{4t} + 8.84819t \quad (1)$$

According to the results from Table 4 the first estimation, the P-value of FDI is equal to 0.8787 and it is greater than alfa 0.05, therefore the variable is not statistically significant. Another regression model must be built without the FDI variable.

Table 4

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	97128	19426	59.55	<.0001
Error	15	4892.81866	326.18791		
Corrected Total	20	102020			
Root MSE		18.06067	R-Square	0.9520	
Dependent Mean		126.51581	Adj R-Sq	0.9361	
Coeff Var		14.27543			

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-68.88823	69.70743	-0.99	0.3387
Oil Prices, USD/Barrel	Oil Prices, USD/Barrel	1	1.59726	0.38573	4.14	0.0009
Inflation, %	Inflation, %	1	-2.67645	1.38556	-1.93	0.0725
Unemployment Rate, %	Unemployment Rate, %	1	4.31503	6.31187	0.68	0.5046
FDI, billion USD	FDI, billion USD	1	0.24661	1.58890	0.16	0.8787
T	T	1	8.84819	2.10298	4.21	0.0008
FDI, billion USD	FDI, billion USD	1	0.24661	1.58890	0.16	0.8787

Source: own calculation

4.4.3 Second regression model

Table 3 indicates results for the second regression model estimation where GDP was selected as the dependent variable, variables: oil price, inflation rate, unemployment rate, time were selected to be independent variables. The second model:

Regression model 2

$$\hat{y}_t = -67.55366 + 1.64314x_{1t} - 2.64585x_{2t} + 4.10391x_{3t} + 8.98640t$$

(2)

Based on the results of estimation in Table 5, without foreign direct investment, the P-value of the unemployment rate 0.5018 is greater than alfa 0.05 therefore the unemployment rate is not statistically significant. The third model will be built without the unemployment rate.

Table 5

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	97120	24280	79.27	<.0001
Error	16	4900.67673	306.29230		
Corrected Total	20	102020			
Root MSE		17.50121	R-Square	0.9520	
Dependent Mean		126.51581	Adj R-Sq	0.9400	
Coeff Var		13.83322			

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-67.55366	67.03226	-1.01	0.3286
Oil Prices, USD/Barrel	Oil Prices, USD/Barrel	1	1.64314	0.24013	6.84	<.0001
Inflation, %	Inflation, %	1	-2.64585	1.32897	-1.99	0.0639
Unemployment Rate, %	Unemployment Rate, %	1	4.10391	5.97264	0.69	0.5018
T	T	1	8.98640	1.84612	4.87	0.0002

Source: own calculation

4.4.4 Third regression model

Table 6 indicates results for the third regression model estimation where GDP was selected as the dependent variable, variables: oil price, inflation rate, time were selected to be independent variables. The third model:

Regression model 3

$$\hat{y}_t = -22.74923 + 1.53065x_{1t} - 2.39776x_{2t} + 7.80745t \quad (3)$$

Based on the results of estimation in Table 4, without the unemployment rate, the P-value of the inflation rate 0.0739 is greater than alfa 0.05 therefore the inflation rate is not statistically significant. The fourth model will be built without the unemployment rate.

Table 6

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	96975	32325	108.92	<.0001
Error	17	5045.28717	296.78160		
Corrected Total	20	102020			
Root MSE		17.22735	R-Square	0.9505	
Dependent Mean		126.51581	Adj R-Sq	0.9418	
Coeff Var		13.61676			

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-22.74923	15.29613	-1.49	0.1553
Oil Prices, USD/Barrel	Oil Prices, USD/Barrel	1	1.53065	0.17292	8.85	<.0001
Inflation, %	Inflation, %	1	-2.39776	1.25897	-1.90	0.0739
T	T	1	7.80745	0.67070	11.64	<.0001

Source: own calculation

4.4.5 Final regression model

Table 7 demonstrates results of the final regression model estimation where the

dependent variable is the GDP, and the dependent variables are oil prices and time.

Results from table 5 indicate that the P-value of the oil prices variable is <0.0001 which is less than $\alpha 0.05$. Therefore, the oil price is a statistically significant variable. T value of oil price is equal to 8.11

Another indicator is the P-value of the time series, which is also less than $\alpha 0.05$, meaning it is statistically significant. The R-square of the estimated regression model is equal to 94% and the adjusted R-square is 93.33%. Thus, 94% of the variation in GDP has been explained by the regression model, which means by oil price and time variable.

Table 7

Analysis of Variance						
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F	
Model	2	95899	47949	140.99	<.0001	
Error	18	6121.79251	340.09958			
Corrected Total	20	102020				
Root MSE		18.44179	R-Square	0.9400		
Dependent Mean		126.51581	Adj R-Sq	0.9333		
Coeff Var		14.57667				
Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-43.69873	11.37832	-3.84	0.0012
Oil Prices, USD/Barrel	Oil Prices, USD/Barrel	1	1.48865	0.18360	8.11	<.0001
T	t	1	8.12925	0.69482	11.70	<.0001

Source: own calculation

Final estimated regression model :

Regression model 4

$$\hat{y}_t = -43.69873 + 1.48865x_{1t} + 9.12925t \quad (4)$$

The model shows that oil prices have an inverse relationship with the GDP, meaning the increase of oil prices has a positive effect on the GDP.

Example: If oil price increases by 1 dollar per year, then the GDP increases by 1.48865 approximately on average per year. But, if the oil price is equal to zero, then the GDP would be decreasing by -43.69873 billion approximately in one year.

5 Results and discussion

In total 4 regression models were built and evaluated. The first estimated regression model was made using annual time series data. As the dependent variable GDP was chosen and as independent variables: oil price, inflation rate, unemployment rate, foreign direct investment, time. Following evaluation P-value of foreign direct investment was found to be greater than α , indicating that the variable was not statistically significant.

The second regression model was built by eliminating foreign direct investments. As the dependent variable GDP was chosen and as independent variables: oil price, inflation rate, unemployment rate, time. Following evaluation P-value of the unemployment rate was found to be greater than α , indicating that the variable was not statistically significant.

The third regression model was built by excluding the unemployment rate. As the dependent variable GDP was chosen and as independent variables: oil price, inflation rate, time. The P-value of the inflation rate was found to be greater than α , indicating that the variable was not statistically significant.

The final regression model was made by excluding the inflation rate. As the dependent variable GDP was chosen and as independent variables: oil price, time. The P-value of the oil price was found to be lower than α , indicating that the variable was statistically significant.

According to the final regression model, there is a strong relationship between oil prices and GDP. In the theoretical part, it was assumed that factors like inflation rate, unemployment rate, FDI also could have a relationship with GDP but after the results of the practical part, it can be stated that the oil price has the strongest influence on GDP. So, the oil sector has the most significant influence on the overall economic performance of Kazakhstan. The economic model is changed from: “The GDP of Kazakhstan is influenced by the annual inflation rate, annual unemployment rate, oil prices, and foreign direct investment” to “The GDP of Kazakhstan is influenced by the oil prices.”

Therefore, using the final regression model next assumptions can be predicted:

If oil price in 2020 would be higher for example not \$32.25 but \$52.25 the GDP would increase from \$169 billion to \$217 billion.

If oil price in 2020 would be lower not \$32.25 but \$12.25 the GDP would decrease from \$169 billion to \$157 billion.

Since the relationship between the oil sector and the economy of Kazakhstan was confirmed by the regression model, it is necessary to emphasize that this kind of

dependency is not healthy for the further economic development of a country. Today most developed countries are making the transition to more sustainable resources. This shift will lead to a drop in oil prices. It means that if Kazakhstan will not find other ways to push the economy most likely the economy will face serious difficulties in the future.

One of the most efficient ways is investing in the technological development of a country. Countries with a stable economy invest mainly in technological development. Technological progress allows to speed up the process of improving the economy. Businesses can increase total production output due to developed technologies because the production process takes less time. Usually, technological improvement allows also to decrease production costs. It leads to higher revenue, so countries' cash inflow increases.

Another way to decrease oil dependence is to invest in small enterprises. The development of small businesses creates the prerequisites for accelerated economic growth, contributes to the diversification and saturation of local markets, while at the same time making it possible to compensate for the costs of a market economy (unemployment, market fluctuations, crisis phenomena). This segment is an element of economic diversification and an area for the development of human capital

6 Conclusion

The main objective of the thesis was to evaluate the dependency between the oil industry and Kazakhstan's economy. In the literature review, the economic theory was observed to provide background for further analysis. In the next part history of Kazakhstan's economic development was described. The most important and significant events and factors that impact the situation in the country were defined. It was proved with various opinions in the theoretical part that there is a strong dependency between the economy of Kazakhstan and the oil sector.

The practical part was comprised of 3 stages:

1. Discussion of choice of variables for analysis;
2. Descriptive analysis of selected variables;
3. Formulating of a regression model;

Relationships between GDP and oil price, inflation rate, unemployment rate, FDI were tested. Three regression models were developed before estimation the final regression model. Results of the practical part confirmed the fact that Kazakhstan's economy deeply relies on the oil sector.

Overall Kazakhstan has gone through many difficult historical stages, and it gained economic stability. But it is still early to celebrate the achievements because oil resources are not infinite as well as demand on it. Countries all over the world are now struggling with the economic consequences of the COVID-19 pandemic. The economy of Kazakhstan suffered a lot from that crisis too. Because oil prices significantly dropped during pandemic GDP of Kazakhstan also declined since there was low demand for crude oil.

As it was discussed it is necessary for Kazakhstan's economic development to shift attention from exporting mainly oil. Diversification of the economy will lead to further development of a country. In the meantime, while the world economy has not yet stopped being carbon-based, it is essential to use the oil reserve potential as efficiently as possible, in the development of which huge investments have been made.

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