The Impact of Oil Prices on the Macroeconomic Indicators of Kazakhstan and the Consequences for the Formation of Social Policy

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ABSTRACT

Kazakhstan achieved substantial economic growth due to its abundant energy resources and it also became highly dependent on resource revenues because of poor diversification. The oil price slumps in 2009 and 2014 demonstrated that Kazakhstan's economy is heavily dependent on energy exports and operates based on large government expenditures. The article analyses the impact of the dynamics of oil prices on the main macroeconomic indicators of the Kazakhstani economy and the consequences of the formation of national social policy. The article applies different hypotheses about the sensitivity of macroeconomic indicators of the economy of Kazakhstan to fluctuations of oil prices, and in addition, it specifies and evaluates a system of simultaneous equations that allows to test these hypotheses. Scenarios for the reaction of the Kazakhstan's economy to exogenous shocks associated with a sharp change in the level of oil prices are considered, and some measures are proposed to reduce the negative consequences of fluctuations in oil prices for the Kazakhstani economy. Finally, the article discusses some of the results of understanding the challenges and realities in the field of social policy, which are generated by the model of economic growth.

Keywords: Crude Oil Prices, Stock Prices, Macroeconomics, Economic Development
JEL Classifications: A10, D04, Q40, Q47

1. INTRODUCTION

Due to the specifics of the structure of the economy and the existing export potential, the most important exogenous factor in economic dynamics for Kazakhstan is oil prices on international markets (Abubakirova et al., 2021; Kelesbayev et al., 2022). Despite the presence of an inhibitory effect on economic growth caused by the strengthening of the real exchange rate of the national currency, Kazakh tenge (KZT), the increase in oil prices and the prices of natural gas, metals and mineral fertilizers correlated with them have a positive effect on the dynamics of the current functioning, and by increasing investment activity (Pomfret, 2005; Jumadilova, 2012; Aitzhanova et al., 2015). On the contrary, a decline in oil prices almost inevitably entails a fall in real Growth Domestic Product (GDP) and investment (Dikkaya and Doyar, 2017; Grabara et al., 2021). The strong dependence of the Kazakhstani economy on the export of raw materials in the face of significant fluctuations in their prices makes the problem of macroeconomic instability quite acute (Macerinskiene and Sakhanova, 2011; Karatayev et al., 2016). The seriousness of the possible consequences of an unfavorable change in the external economic situation can be confirmed by the sharp drop in Kazakhstan's real GDP in 2008,

2015 and 2020, largely due to a significant decline in world oil prices (Bayramov and Abbas, 2017; Czech and Niftiyev, 2021). In 2022, Kazakhstan's GDP expanded 4% driven by a rebounding economy, consumption growth, and supportive fiscal policy (Figure 1). The GDP in Kazakhstan is expected to reach 160 USD billion by the end of 2023 (Figure 2). In the long-term, the Kazakhstan GDP is projected to trend around 175 USD billion in 2022 (WB, 2022).

The change in oil prices depends on the current political and economic situation in the world (Filis, 2010; Masood et al., 2019). The fall in oil prices is due to the influence of a wide range of negative factors, including as a result of: the actions of OPEC members (oversupply, the desire to eliminate competition); recession of the economy (lack of a trend of sustainable development of the economy, slowdown in the Chinese economy) and, as a result, a decrease in energy consumption in a number of countries; growth in oil production, including shale oil in the US and Canada, the expansion of oil production facilities in Libya, an increase in the flow of illegal oil; Iran's expected exit from the sanctions regime (Braginskii, 2009; Babcock and Fabiosa, 2011; Tishkov et al., 2020).

The sharpest jumps in its value occurred in 1998, when the Asian financial crisis led to a drop in the price of oil to 10.77 USD per barrel of Brent (Chaudhuri and Daniel, 1998; Tleppayev, 2019). Since 2002, a long and almost continuous increase in oil prices began, which was explained by military operations in Iraq, a reduction in oil production in Mexico, Great Britain and Indonesia, an increase in oil consumption in the Persian Gulf countries, and the urbanization of China (Beckmann et al., 2020). In 2008, the price of Brent oil for the first time in history exceeded 100 USD per barrel, but at the end of that year, the global financial crisis plunged oil prices to nearly 34 USD per barrel (Ederington et al.,

2019). However, the decline in oil prices again did not last too long, and from mid-2009, oil prices began to rise. This continued until August 2014, when, due to a number of factors, prices began to fall. Compared to June by December 2014, oil prices fell by 30% (De et al., 2019).

The problem of the sensitivity of the economy of Kazakhstan to fluctuations to oil prices attracted the attention of a number of researchers. In particular, Bhat et al. (2022) analyze the role of oil price fluctuations in shaping the macroeconomic dynamics of the Kazakh economy using the regression analysis. Sansyzbayeva et al. (2020) estimated a compact system of simultaneous equations, reflecting, among other things, the dependence of the economy on the dynamics of world oil prices. Nurpeisova et al. (2020) assessed the impact of the external economic environment on the dynamics of the economy is also taken into account in large econometric models of the economy. Lee et al. (2009) and Rakhmatullayeva et al. (2020) have proposed an interesting theoretical model for the analysis of structural changes in an open economy focused on the export of raw materials.

From our point of view, an attempt to formulate and test a number of basic hypotheses about the nature of the influence of the dynamics of oil prices on the dynamics of the main macroeconomic indicators of the Kazakhstani economy in modern conditions deserves attention, as well as to trace the impact of an external shock associated with a sharp decline in oil prices on dynamics of GDP, investment and exchange rate. To do this, the article aims to apply a compact system of simultaneous econometric equations, which is quite economical in terms of the number of parameters used and reflects the dependence of the main macroeconomic parameters. These parameters include GDP, investment, consumption, exchange rate, exports, and oil price dynamics.
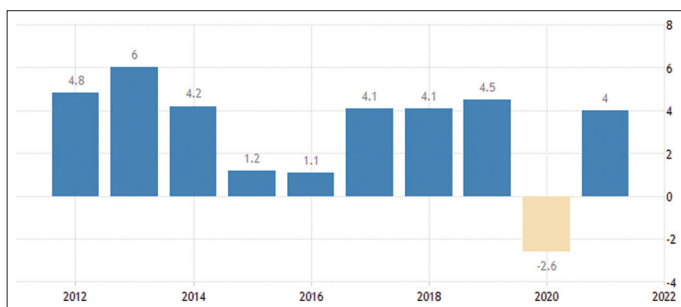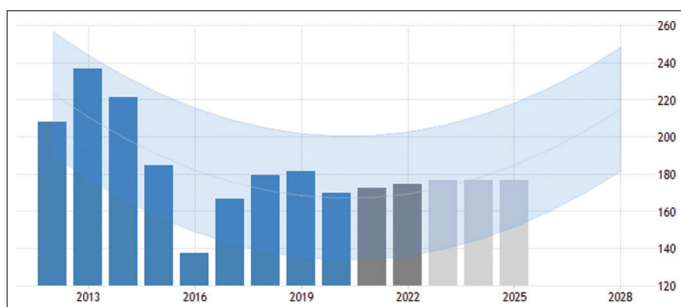
Figure 1: GDP growth of Kazakhstan, %

Figure 2: Scenario of GDP growth, USD billion

2. METHODOLOGY

As a methodology, a system of econometric equations is proposed, which includes five regression based equations and two identities:

$$ln(CS_t) = C_1 + C_2\, ln(CS_{t-1}) + C_3\, ln(y_t) + C_4 q1_t + C_5 q2_t + C_6 q3_t + U_t \quad (1)$$

$$ln(i_t) = C_1 + C_8\, ln(i_{t-1}) + C_9\, ln(b_t) + C_{10}\, ln(y_t) - ln(y_{t-4}) + C_{11} q1_t \ldots + U_{2t} \quad (2)$$

$$ln(xp_t) = C_{14} + C_{15}\, ln(xp_{t-1}) + C_{16}\, ln(b_t) + C_{17}\, ln(e_t) + C_{18} q1_t \ldots + U_{3t} \quad (3)$$

$$ln(m_t) = C_{21} + C_{22}\, ln(m_{t-1}) + C_{23}\, ln(e_t) + C_{24}\, ln(y_t) + U_{4t} \quad (4)$$

$$ln(e_t) - ln(e_{t-1}) = C_{25} + C_{26}\, ln(b_t) + C27\, ln(b_{t-1}) + C_{28}\, ln(i_t) + U_{5t} \quad (5)$$

$$tb_t = xp_t - m_t \quad (6)$$

$$y_t = CS_t + i_t + tb_t \quad (7)$$

y - GDP in real terms; CS - consumption in real terms; i - investments in real terms; xp - export in real terms; m - import in real terms; tb - net exports in real terms; b - oil price mark Brent; e – KZT tenge to US dollar exchange rate; $q1, q2, q3$ - variables

to denote the first, second and third quarters; t - index to designate a quarter.

Fluctuations in the price of oil on world commodity markets are considered as the main exogenous variable that determines the dynamics of an open economic system. Endogenous variables determined within the system are real GDP and its structural components, as well as the exchange rate of the tenge against the US dollar. Equation (1) defines the consumption function using the specification of the partial adjustment model, when real consumption gradually adjusts to the change in the level of real GDP caused by changes in net exports and investment, which in turn depend on exogenous factors (primarily oil prices). To account for seasonal fluctuations, variables are introduced into the equation to designate individual quarters. Equation (2) reflects the dependence of investment activity in the economy of Kazakhstan on the level of oil prices and the previous growth of real GDP (the accelerator effect).

It is assumed that the level of oil prices affects the volume of investment activity through several channels. First, high oil prices directly expand the investment opportunities of the budget and backbone Kazakhstani companies operating in the oil and gas sector (Bernardini, 2008; Dutta et al., 2020). Secondly, if oil price expectations in the future are largely formed on the basis of the current price level, then with an increase in oil prices, forecast estimates of the prospects for generating operating cash flows from projects that are not only implemented in the energy and raw materials sector and are oriented to external demand, but also focused on meeting domestic demand due to the expected growth in the purchasing power of the population and the easing of financial restrictions on business and the public sector (Joffé et al., 2009; Sadorsky, 2014; Berntsen et al., 2018; Karatayev et al., 2022). Thirdly, due to the fact that the main channel for the formation of the monetary base in the economy is the replenishment of gold and foreign exchange reserves by buying out part of the foreign exchange earnings of exporters, high oil prices are accompanied by an easing of monetary policy, i.e., an increase in the growth rate of the money supply and lower interest rates, which has a positive effect on investment activity (Kalyuzhnova, 2011; Nurseiit et al., 2019).

The reverse processes take place when oil prices fall: investments shrink as a result of a reduction in the current financial capacity of the budget and large companies, the formation of pessimistic expectations about the prospects for the implementation of new investment projects and the tightening of monetary policy (Badeeb et al., 2016; Wang et al., 2020). To account for seasonality, quarterly dummy variables are introduced into the equation. The gradual nature of the adaptation of economic agents to a new level of oil prices determines the need to include a lagged level of investment in real terms in the equation. Equations (3) and (4) determine the volumes of exports and imports in real terms. Both equations are written in the form of a partial adjustment equation. The oil price level and the exchange rate of the tenge against the US dollar are considered as the main factors in the formation of the volume of exports (assuming that the depreciation of the KZT tenge stimulates exports). The level of real GDP and the exchange rate

of the KZT tenge against the US dollar are considered as the main factors in the formation of the volume of imports (assuming that the growth of real GDP and the strengthening of the tenge against the US dollar stimulate imports). Quarterly dummy variables are introduced into Equation (3) to account for the seasonality of export deliveries.

As the main factors influencing the dynamics of the exchange rate of the KZT tenge against the US dollar, in accordance with Equation (5), the level and dynamics of oil prices, as well as changes in the volume of investments in real terms are considered. The current level of oil prices reflects the inflow of foreign currency into the country through current operations (Mina, 2007; Razmi and Behname, 2012). The change in the level of oil prices is considered as a key variable reflecting devaluation or revaluation expectations. Thus, the decline in oil prices raises doubts among economic agents about the ability of the national bank to maintain a stable level of the exchange rate and creates the preconditions for a speculative attack on the tenge. On the contrary, the increase in oil prices strengthens the confidence of economic agents in the stability of the tenge (Karatayev et al., 2021). The change in investment in real terms is treated as a proxy for capital inflows into the Kazakh economy, which helps the tenge appreciate against the US dollar.

Macroeconomic identities (6) and (7) complete the system and ensure the consistency of predictive estimates of interrelated macroeconomic parameters. The values of all model variables can be obtained using publicly available sources of information. When forming the database for estimating the parameters of the model, the values of the exchange rate of the tenge against the US dollar and the price of Brent oil for the corresponding quarter were calculated as the average value of the values of the corresponding variable for the last dates of each month of the quarter. To ensure consistency in the values of (a) net exports, (b) exports and (c) imports, real exports were defined as the sum of imports and net exports. The statistical discrepancy was not taken into account, and GDP in real terms was calculated as the sum of investment, consumption and net exports in real terms.

3. RESULTS AND DISCUSSION

In the course of evaluating the system according to formulas (1)-(5) using the EViews 6.0 package, estimates of the parameters of equations were obtained, presented in Tables 1-4.

The obtained values of the coefficients for the explanatory variables have the expected signs and are statistically significantly different from zero (except for the coefficient for the dummy variable to indicate the second quarter). In the long run, the share of consumption in GDP is stable, but in the short run, the response of consumption to changes in GDP is much weaker. The elasticity of consumption to GDP is about 30%.

The evaluation results confirm the hypothesis put forward about the close relationship between investment activity in the Kazakhstani economy and the level of oil prices. In the long run, a 10% increase in oil prices results in a 6.5% increase in investment in

real terms. Judging by the value of the regression coefficient, the reaction of investments to GDP dynamics is somewhat higher (the short-term value of the elasticity coefficient turns out to be 0.89), however, this conclusion is not entirely unambiguous due to the high standard error of the coefficient. As one would expect, investment reacts much faster to changes in the macroeconomic situation compared to consumption.

The results obtained confirm the hypotheses put forward about the dependence of the level of exports on the level of oil prices and the exchange rate. In addition, there is a pronounced seasonality of export earnings with a peak in the fourth quarter and a minimum in the first quarter of the calendar year.

The estimation results confirm the hypotheses put forward about the dependence of the volume of imports on the volume of real GDP and the exchange rate. At the same time, the high elasticity of imports to real GDP deserves attention, even in the short run. The rate of adaptation of imports to changes in the external economic situation and the macroeconomic situation

in the country is noticeably higher compared to the rate of adaptation of exports.

The results of the calculations show that the model accurately predicts the consequences of an external shock, which manifested itself in a sharp reduction in real GDP, investment and consumption, the volume of export and import operations, as well as in the devaluation of the tenge against the US dollar. At the same time, the model somewhat underestimates the actual scale of the fall in real GDP, consumption, and investment.

In order to assess the possible consequences of various options for changing the external economic situation for the main macroeconomic indicators of the economy in the short term (2022-2026), we will define several likely scenarios for changing the oil price (Table 5).

Internationally, Brent crude oil prices is averaged nearly 117 USD per barrel in March 2022. Under the expected scenario, the International Monetary Fund (IMF), Energy Information Administration (EIA), Organisation for Economic Co-operation and Development (OECD) assume that the price of a barrel of Brent oil will stabilize between 65-58 USD by 2026 (Figures 3-5). However, some factor have been ignored. In February 2022, world oil prices soared above 100 USD a barrel to their highest level since 2014 due to Russia's military operation in Ukraine.

Table 1: Estimates of consumption function parameters

Indicators	Coefficients	St. error	t-statistics	P-value
Constant	−0.1948	0.0857	−2.2737	0.0239
$ln (cs_t-1)$	0.7166	0.0493	14.5433	0.0000
$ln (y_t)$	0.2993	0.0496	6.0365	0.0000
$q1_t$	−0.0701	0.0112	−6.2532	0.0000
$q2_t$	−0.0093	0.0072	−1.2900	0.1983
$q3_t$	−0.0217	0.0072	−2.9955	0.0030

Dependent variable $ln(cs_t)$, R^2=0.9945

Table 2: Estimates of investment function parameters

Indicators	Coefficients	St. error	t-statistics	P-value
Constant	1.8587	0.3534	5.2596	0.0000
$ln (cs_t-1)$	0.5040	0.0643	7.8357	0.0000
$ln (b_t)$	0.3252	0.0740	4.3931	0.0000
$ln (y_t)-ln (y_t-4)$	0.8898	0.4705	1.8911	0.0598
$q1_t$	−0.1656	0.0713	−2.3205	0.0211
$q2_t$	0.1699	0.0826	2.0583	0.0406
$q3_t$	0.6260	0.0745	8.4058	0.0000

Dependent variable $ln(i_t)$, R^2=0.8208

Table 3: Estimates of export function parameter

Indicators	Coefficients	St. error	t-statistics	P-value
Constant	1.3399	0.3979	3.3670	0.0009
$ln (xp_{t-1})$	0.7728	0.0754	10.2513	0.0000
$ln (b_t)$	0.0730	0.0314	2.3234	0.0210
$ln (e_t)$	0.0395	0.0162	2.4362	0.0156
$q1_t$	−0.2691	0.0224	−12.0175	0.0000
$q2_t$	−0.0960	0.0210	−4.5679	0.0000
$q3_t$	−0.1135	0.0208	−5.4562	0.0000

Dependent variable $ln(xp_t)$, R^2=0.9661

Table 4: Estimates of import function parameter

Indicators	Coefficients	St. error	t-statistics	P-value
Constant	−6.0604	0.7795	−7.7750	0.0000
$lm(m_{t-1})$	0.3289	0.0629	5.2295	0.0000
$ln(e_t)$	−0.0897	0.0303	−2.9607	0.0034
$ln(y_t)$	1.3330	0.1411	9.4489	0.0000

Dependent variable $ln(m_t)$, R^2=0.9190
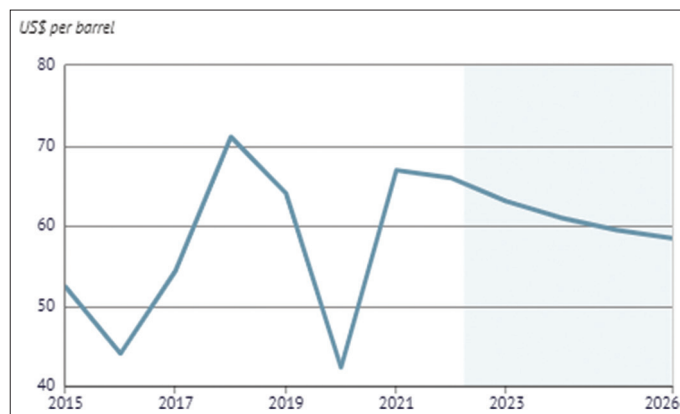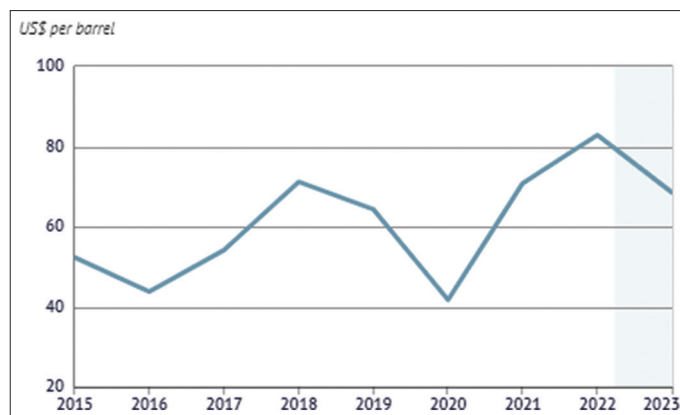
Figure 3: IMF Brent crude oil price projection

Figure 4: EIA Brent crude oil price projection

As part of the optimistic scenario, it is assumed that during 2022 the price of a barrel of Brent oil will grow, by the beginning of 2035 it will reach 125 USD and will continue to grow at a moderate rate (Figure 6).

As part of the pessimistic scenario, we will assume that during 2022, the price of a barrel of Brent oil will decrease, by the beginning of 2026 it will reach 67 USD per barrel. The quantitative parameters of these scenarios are given in Table 5, the results of simulation calculations for the model corresponding to each of the considered scenarios.

The results of simulations for the expected oil price scenario indicate that the Kazakh economy has the potential for significant recovery growth as early as 2023, while the real GDP growth rate may be about 3-5% compared to the unfavorable 2020. Investments, exports and imports in real terms may return to levels reached in 2015, and the exchange rate will stabilize at 450 KZT tenge per US dollar.

Simulation calculations for the optimistic scenario of oil price dynamics show the possibility of significant economic growth even if the existing raw material model of the organization of the Kazakhstani economy is preserved. The traditional driver of

economic growth in Kazakhstan is a favorable external economic environment, which in this case provides an increase in real GDP by 3-5%. In parallel with real GDP, investments, exports and imports are growing. The growth rate of imports turns out to be higher compared to the growth rates of exports due to the tendency to strengthen the tenge exchange rate, which is subject to the continued upward trend in world oil prices. The main threats stemming from the peculiarities of the current structure of the economy and the nature of its reaction to changes in the external economic situation become especially evident when considering a pessimistic scenario for the dynamics of world oil prices. In this case, the economy of Kazakhstan expects a serious recession, accompanied by a decrease in the real values of consumption, investment, exports and imports. The deterioration of the trade balance and the pessimistic expectations of investors in this scenario cause the exchange rate to fall.

Social protection of the population and social policy is always a topical issue of economic policy and economic efficiency. This is all the more important for Kazakhstan, which claims to be a social state (Bidaishiyeva et al., 2018). A socially oriented market economy implies a significant activity of the state in solving social problems. This is due to the fact that the market economy does not guarantee workers the right to work, standard welfare, education, does not provide social protection for the disabled, the poor, pensioners (Bugubayeva et al., 2016). Therefore, there is a need for state intervention in the sphere of income distribution through social policy. In the context of the current global economic crisis, this is simply vital (Mukhamadiyeva et al., 2017). Ultimately, everything depends on the solution of this problem: the power and independence of the state, the well-being of the people, the stability of the political atmosphere in society. During the transition to a market economy, this circumstance predetermined the emergence of many problems in the field of social policy pursued by Kazakhstani government structures at various levels, and to a large extent determined the financial nature of most of them (Jussupova, 2019; An and Kulmala, 2021). The problem of financing social policy measures naturally comes to the fore in the context of the deterioration of the country's socio-economic development during the period of falling oil prices and the depreciation of the KZT tenge (Tsaurkubule et al., 2020).

At the present stage of development of Kazakhstan, in order to manage the development of regions, it is necessary to ensure high-quality and continuous analysis and forecasting of socio-economic, socio-political situations and social processes. The

Table 5: Scenarios for Brent oil price dynamics between 2022 and 2026, USD per barrel

Scenarios	2022	2023	2024	2025	2026
Expected	65.9	63.4	60.9	59.4	58.2
Optimistic	90.5	94.6	102.5	106.5	115.8
Pessimistic	82.8	80.1	75.5	70.3	67.8

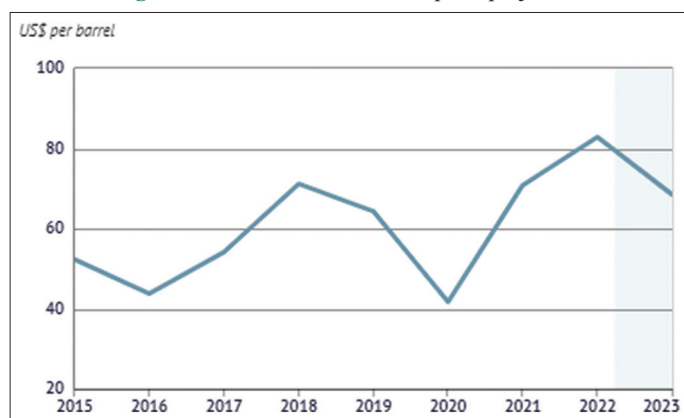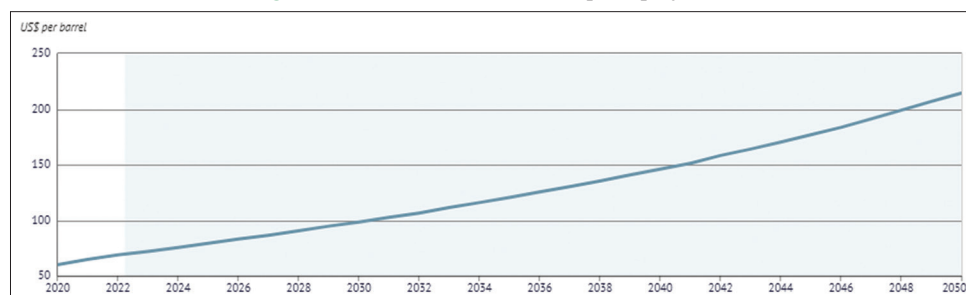**Figure 5:** OECD Brent crude oil price projection

Figure 6: Authors' Brent crude oil price projection

main directions of development of Kazakhstan are implemented on innovative economic and social principles and include the diversification of the economy, improving the quality of human capital, improving the demographic situation, and the policy of sustainable employment of the population (Khamzin et al., 2016). In the knowledge economy, human capital is the main competitive advantage. It is he who makes it possible to carry out innovations, adapt to the conditions of the globalization of the world economy, and achieve high competitiveness (Rivotti et al., 2019; Spankulova et al., 2022). Proceeding from this, high-quality human capital is an important condition for the socio-economic development of the country, ultimately determining its level (Anderson and Heyneman, 2005). This approach is especially relevant in the modern economy, when a constantly developing person becomes a source of social development (Khamzina et al., 2015).

4. CONCLUDING REMARKS

The results of the analysis show that the economy of Kazakhstan is extremely sensitive to fluctuations to oil prices. Its sustainable development is impossible without the implementation of urgent measures to diversify and modernize, the transition from an export-raw material to an innovation-oriented model of economic development. The raw nature of Kazakhstan's economy and its high sensitivity to external shocks make the national currency a fundamentally unstable currency. The main collateral for the KZT tenge is the inflow of export foreign exchange earnings, which depends on the conjuncture of foreign markets. Therefore, in the long term, the KZT tenge is a rather risky savings instrument and has worse prospects compared to the currencies of other countries for performing the functions of one of the world's reserve currencies after the probable loss of the function of the monopoly dominant world reserve currency by the US dollar. Like the Kazakh economy as a whole, Kazakhstan's backbone non-financial companies are highly dependent on fluctuations in commodity prices and exchange rates, however, these risks are not effectively measured and managed internally. The specific structure of the Kazakhstani economy and its susceptibility to external shocks determine the objective need to create a system of supervision over risk management in backbone non-financial companies, by analogy with the system of prudential supervision for the banking sector. Since the revenues of the consolidated budget of Kazakhstan, as well as GDP, are significantly dependent on fluctuations in commodity prices on world markets, a thorough analysis and monitoring of the development of the world economy and the dynamics of the external economic situation, as well as the formation of special stabilization funds, should be supplemented by the introduction of a risk hedging system at the level of public administration, finances of Kazakhstan, which could also significantly reduce the negative consequences of adverse scenarios for changes in prices for the main goods of Kazakhstan's exports for the country's economy.

The national model of social policy in Kazakhstan was initially focused on using the benefits and opportunities of sustainable economic growth to improve the well-being of the people. The key task of improving the standard of living of any state is to reduce poverty. Kazakhstan has identified poverty reduction as one of the main objectives of the implementation of the national strategy for the long term. At present, its implementation has made it possible to reform labor relations and employment of the population, make the transition to a funded pension system, introduce new types of social benefits, and create a targeted system for providing social assistance. Summing up, it can be noted that the state of modern society will reach a new qualitative level, when the content of the concept of "social policy" will include all spheres of human existence, when it is no longer considered as part of politics in general and part of economic policy in particular. With regard to social policy in Kazakhstan, there has been a movement from the standard of living of the people to a modern interpretation. The country's economy cannot be considered effective if it does not fulfill its main tasks - to satisfy the needs of citizens, to ensure the growth of the standard of living of the population and national well-being. At the same time, the implementation of the planned tasks is possible only in the conditions of an effective economic policy of the government.

5. ACKNOWLEDGEMENT

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