

The Issues and Analysis of Risk Management on an Example of the Azerbaijani Oil of Azeri Light in the Conditions of Uncertainty and COVID-19

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ABSTRACT

This article studies the uncertain conditions of the oil industry in and post crisis period in Azerbaijan Republic during COVID-19 in 2020. Existing turmoil in the global economy and volatile oil prices affected the economies of the oil-producing countries. Azerbaijan Republic is considered as one of the countries that depends on oil markets. Such instability also affected the economy of Azerbaijan Republic and led to a decrease in its key economic indicators, which leads to the application of specific methods for identifying risks and estimating its valuation. The reasons of the sharp drop in oil and oil products demand have been analyzed with the Monte Carlo techniques and with its impact on Azerbaijan Republic as an example. The author, compiling the forecast for the chosen methodology, clarified the forecast of the 2020-2021 oil price of an Azerbaijani oil brand Azeri Light in an uncertain environment and made forecast for coming years.

Keywords: COVID-19, oil crisis, post-crisis oil industry, forecast, Monte-Carlo.

1. INTRODUCTION

Risk management is a system of controlling risk and economical, financial relations, which are being arisen during this process. When we speak the word “risk” first in our thoughts appears industrial and economic activities. Risk management is based on purposeful search and organization of work for reducing the level of risk on the way of earning and increasing income in an uncertain economic situation. The final goal of Risk management is to obtain the greatest profit with an optimal ratio of profit and risk acceptable to the company, organization, etc.

2. RISK MANAGEMENT IN CONDITION OF UNCERTAINTY

The essence of the risk is the following elements: the reality of the desired result; the likelihood of losses; the possibility of deviation from any issued solution using alternative options; and profits associated with the choice of the right or wrong method or factor.

The main features of risk include alternativeness, inconsistency of nature and

uncertainty:

- Alternativeness - gives an opportunity to compensate in case of failure of the basic direction.
- Inconsistency comes out when the objective opinion of one expert meets with the subjective decision of another, and in fact causes this problem to remain in a state of suspension until a certain compromise is revealed.
- Finally, one of the most important functions of risk is its activity in conditions of uncertainty.

In year 2020 the source of global uncertainty became the Coronavirus disease (COVID-19) which led to economic shock all over the world. COVID-19 had emerged as a bane for the financial markets with high volatility and unexpected levels of uncertainty. Within less than 100 days, 35% of wealth has been blurred globally, and more increased panic and indeed uncertain condition in the markets led COVID-19 from epidemic to pandemic, affecting the great number of countries and its economics.

Surely, this kind of pandemic situation in most cases has short term economic influence, but it also should be considered to have a substantial impact to some areas of economy, as an example to oil industry. It should be emphasized that oil market considered to be unique in terms of impact, as both positive and negative situation and news from oil market affected oil prices equally, and additionally this pandemic situation occurred at a time when the oil market was already sensitive and under force. Over a decade and more the focus of researchers was - on how effective would be a forecasting of market stock returns, however past 4-5 years this focus shifted to predicting oil price itself. An unexpected decline in oil prices in 2015-2016 and the strong imbalance between supply and demand in the oil market required measures to stabilize discontinuity in the oil market. The lowest price for the “Brent” crude oil (considered the benchmark of all world oil prices) in January 2016 was about \$27.88 per barrel. It was maintained by the Agreement of OPEC and Non-OPEC oil producing countries (since 2017), and the situation was reached to some stabilization, when at the end of 2019 and in the beginning of 2020 a new issue was arisen.

The oil industry is one of the key industries in Azerbaijan Republic, which has its own history since the first oil boom, happened in 19th century.

After the sudden decrease in oil prices in 2015-2016 the minimum price of the Azerbaijani oil of “Azeri Light” brand was observed in January 2016 - \$28.82 per barrel, even though the highest oil price was recorded in 2008 as \$149.66 per barrel. [pic.1] [1][2][4]



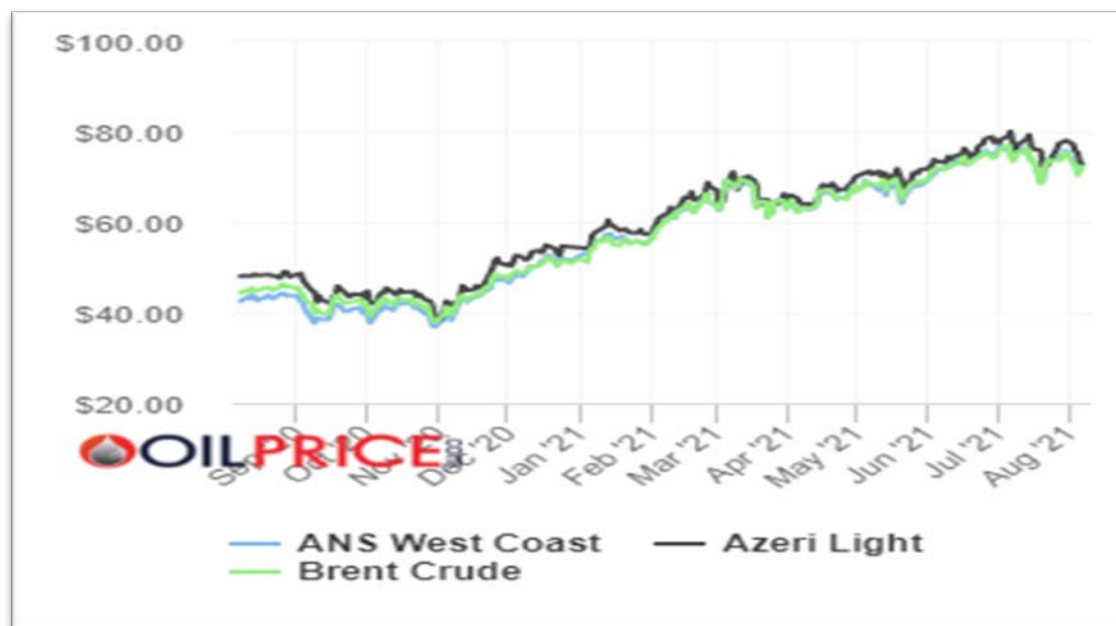
Pic.1 Oil price for Azeri Light brand, 2019-2021
source: oilprice.com

In general, a rash decline in oil prices negatively affected the economy of Azerbaijan in 2015-2016. The situation was conditioned by the uncertainty in the economic and political environment. This had a critical impact on the activities of the oil companies both in the world and in Azerbaijan Republic during this period in the form of cost saving and cost reduction. When the reserves of the State Oil Fund of the Republic of Azerbaijan (SOFAZ) reached a critical point, the government resorted to devaluation. The devaluation of the national currency was nearly 50% (February 2015 USD to AZN – 0.78 to 1.05, in December 2015 from 1.05 to 1.50).

Despite all pessimistic consequences, the formed situation became a motivation for the necessary economic reforms, which diversified domestic economy in various spheres of the State. Using necessary financial tools, the State managed to keep the increasing of the inflation and improve GDP indicators, and to stop the dollarization of the economy. Therefore, by 2017, the amount of dollar loans and deposits became noticeably less. After issuing the floating exchange rate, the Azerbaijani Manat was being balanced with USD at the level of 1.70 and being remained the same till nowadays. And although GDP in Azerbaijan measured to 37.87 billion US dollars in 2016, then it was improved to 48.05 billion US dollars in 2019, according to official data from the World Bank.

Oil industry, that plays an important role in the economy of Azerbaijan Republic in particular, also plays a vital role in shaping budget forecasts for the upcoming years. This process was severely affected during the “oil crisis”. In 2015 oil production in Azerbaijan amounted to 41 million 586 thousand tons,

whereas in 2016 this figure was set at the level of 41 million 34.5 thousand tons of oil



Pic.2 Comparison Oil price Azeri Light and Brent, 2020-2021

source: oilprice.com

(by 1.3% less); in 2017– 38.688,900 tons (decrease of 5.7% compared to 2016); in 2018 – 38.814 tons (increase of 0.3% compared to 2017) and in 2019 - 37.500 tons (decrease of 3.4% compared to 2018) (due to Agreement between OPEC and Non OPEC oil producing countries from 2017 with cutting the oil production. 35 thousand barrel per day for Azerbaijan), according to the data of SOCAR (State Oil Company of Azerbaijan Republic).

A dramatic change in the industry has changed by COVID-19 once more after the stabilized years. And what was troubling issue of COVID-19, in comparing with other such kind of viruses or situations, that it had greater scale – and was more connected among the countries due to travelling.

In April 2020, the lowest price for the “Brent” crude oil, was stated in about \$19.33 per barrel. And for Azerbaijani oil “Azeri Light” brand in April 2020 it was measured to \$15.81 per barrel (the lowest in Azeri Light brand history). [pic.2][3]

GDP for the first three quarters of 2020 was contracted to 4%, comparing to 2019. In the fourth quarter of 2020 it was reported to 12.35% compared to 2019 same quarter, according to the National Statistics Committee of Azerbaijan Republic.

However, it should be indicated that the correct financial policy of the Government at such a critical point led to avoid the third devaluation of the national currency, as 90% of budget income referred to oil production and export. It was remained 1.70 AZN to the dollar.

3. RESEARCH AND RESULTS

In calculating, assessing and managing risks one of the main points is - gathering of information. Analyzing risks, primarily internal and external factors are being considered, which become the causes of a decrease or increase in certain types of risk. The purpose of the studies is to determine how sensitive the system is to this or that type of risk, that is being used. Having established the necessary level, it is being turned to a qualitative analysis, and in the end the work is being completed with a quantitative analysis, deriving the necessary formula and method for reducing potential risk. The effectiveness of a formula or model identified by a mathematical method, and their relevance in making decisions of similar problems, depends on the conclusions of qualitative analysis. This is an example of business plan, which can include all the advantages and disadvantages of a future system.

The collapse of oil prices, including all affection it had after oil crisis in 2015-2016 years, occurred during that period when COVID-19 had stressed much of global economic activity. Although the lack of any information regarding this new phenomenon was big enough, but some new research and analyses were very helpful for collecting necessary information. Most of the existing analyses explore the direct influence that COVID-19 has had on the oil price (Gil-Alana & Monge, 2020; Liu et al., 2020; Narayan, 2020; Qin et al., 2020), and very few studies are being focused on any possible change in the relationship between investor sentiment and futures price. This focus was also important because after any major shock, the influencing mechanism or the influence level of the factors that drive futures prices, are likely to be different. Well, the effect of oil price changes on the stock market is stronger under unexpected shocks than under normal circumstances.

For over the years oil industry has been the most huge and competitive one and has been the main source for income to the budget of the most oil producing countries. The history of the price changes shows its fluctuations and various kind of directions in its stabilization. This what make the analysis and forecasts for this industry quite challenging. In addition, it should be mentioned that the oil sector is more defined than others with high degree of uncertainty due to the constant geopolitical influence. Therefore, author developed its own estimation of forecast using the Monte Carlo method, compiled on the formula of geometric Brownian motion, used in the uncertain conditions.

Monte Carlo simulation can be described as the generation of random objects or processes by means of a computer. This method, or stochastic modelling, is based on the collection of exponential motions. In contrast with historical method, the Monte Carlo method is an accidental continued process, the logarithm of which is a Wiener process (mathematical model of Brownian motion) often used in pricing models. Expression consists of the mathematical expectation and variance.

The significance of the Monte Carlo method is to recognize the mathematical expectation of the price, by multiplying the generation of all possible pricing methods. The historical data will be taken as a basis, then will be calculated: S_t - the new oil price at the future time t , S_0 - the fixed price for oil as of a certain date, μ - the

average value or the mathematical expectation expressed in %, σ - the standard deviation expressed in %, $\exp(x)$ - an exponential function, the number e (~ 2.72) to the power of x .

The equation can be written in the following discrete form:

$$\Delta S_t = S_{t-1}(\mu\Delta t + \sigma\varepsilon\sqrt{\Delta t})$$

The first term is “drift” and the second term is “shock”. For each time-period author assumes the price would be “drifted” up by the expected return. And the “drift” would be “shocked” by a random shock. The random shock would be the Standard Deviation (S) multiplied by a random exponential number “ e ”. Formula also could be seen as:

$$S_{t+1} = S_t + S_t(\mu\Delta t + \sigma\varepsilon_1\sqrt{\Delta t})$$

$$S_{t+2} = S_{t+1} + S_{t+1}(\mu\Delta t + \sigma\varepsilon_2\sqrt{\Delta t})S_T = S_{t+n}$$

...and so on.

The process could be more detailed as: the price trajectory is a sequence of pseudo-randomly modelled prices, where a whole series of numbers are appeared, which, if carefully sorted, will be used to determine the average value of the risk range of the oil price. The curve of price formation is a series of irregular generated prices, starting from a given current price and ending with the last one. In case this area consists of equal steps, the random variable will conform with the standard normal distribution. Each such curve is based on the scenario in which the price is set at the last step. The optimal number of steps in the process depends on the length of taken period.

Step-by-step Monte Carlo method works as:

1. According to retrospective data, the mathematical expectation (μ) and the variance are being calculated.
2. With a random number generator, normally distributed random numbers e ($\exp(x)$) are generated with the expectation equal to μ and the standard deviation (σ)
3. Random numbers e obtained in the previous step fill in a table of arbitrary dimension (to ensure high accuracy, it must be sufficiently large, for example, 500 columns per 1000 rows).
4. The trajectory of the modelled prices is calculated up to \$1000 using the above formula.

If more than 10,000 random iterations are being generated, then the result will be as close to the truth as possible, though this will take a lot of time and effort. The certain advantage of the Monte Carlo method is that, unlike the historical modelling, it allows to consider not a single price trajectory (scenario), but promptly many, which

as a rule, improves the accuracy of estimates. There is also a disadvantage of this technique as it gives low accuracy for really short period of time (example couple of months). [1][4][5][6][7]

4. CONCLUSIONS

There are lots of quantitative techniques that are especially adequate in resolving problems, involving some various sources of uncertainty. A great advantage of Monte Carlo techniques for risk analysis is that they can be comfortably used to run scenario analysis — and that they are able to be used to compute risk outcomes under number of different model expectations.

It also demonstrated to be particularly useful in the analysis of the risk of large portfolios of financial products. The received data, as a result, produced positive feedback.

Based on this analysis the total deviation from the data obtained by using the Monte Carlo method is not more than the actual picture. Using the formula arranged for the Monte Carlo analysis, the author settled the maximum price - \$80 per barrel for the oil of “Azeri Light” brand for 2020-2021, and the minimum price - \$40 per barrel, which responded positively to the indicators set by the Government of Azerbaijan in late 2019-2020. The average price was set at \$55 per barrel. COVID-19 was the issue, which was accepted as the unknown value for analysis. This is an essential issue for understanding because as much as COVID-19 has been unexpected phenomena, its scale has been matched by government policies to be secured from its negative consequences. Therefore, it is important for researchers to get these policies, correctly use them for own studies and make out new way of resolving problems in uncertain economic conditions.

The Monte Carlo Method goes on to be one of useful ways to scientific computing due to its simplicity and general appropriateness. And this, in its turn, proves that this expression can be applied in the calculation of risks and corresponds to the set conditions.

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