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## **ASSESSMENT OF THE PROBABILITY OF BANKRUPTCY OF PJSC LUKOIL**

***Abstract:** the article describes bankruptcy issues and information on conducting an assessment of the probability of assessing the bankruptcy of companies. Based on the data from the accounting statements of the oil and gas company PJSC Lukoil, the probability of bankruptcy of the company was assessed using four bankruptcy forecasting models. The article presents the conclusions of the analysis, evaluates the success of the introduction of the financial policy of the company.*

***Keywords:** bankruptcy assessment, bankruptcy, Lukoil, five-factor model, financial policy, bankruptcy forecasting models, Chesser`s model, Altman`s model, Belikov-Davydova`s model, Zaitseva`s model.*

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## ОЦЕНКА ВЕРОЯТНОСТИ БАНКРОТСТВА ПАО «ЛУКОЙЛ»

***Аннотация:** в статье описаны вопросы банкротства и информация по проведению оценки вероятности оценки банкротства компаний. На основе данных из бухгалтерской отчетности нефтегазовой компании ПАО Лукойл проведена оценка вероятности банкротства компании с применением четырех моделей прогнозирования банкротства. В статье представлены выводы по проведенному анализу, оценена успешность введения финансовой политики компании.*

***Ключевые слова:** оценка банкротства, банкротство, Лукойл, пятифакторная модель, финансовая политика, модели прогнозирования банкротства, модель Чессера, модель Альтмана, модель Беликова-Давыдовой, модель Зайцевой.*

PJSC Lukoil is one of the leading producers of petroleum products in Russia, actively engaged in the extraction, production and sale of oil, gas and related products. In recent years, the company has been actively strengthening its positions in both domestic and foreign energy markets. The company is working to improve its mining technologies and address environmental issues.

Despite volatile market conditions, Lukoil maintains large volumes and high levels of oil production and exports. Project development continues both in Russia and abroad, albeit in a limited format.

The efficiency of PJSC Lukoil's operations has been affected by various macroeconomic and microeconomic reasons, in particular, the epidemiological situation in 2020 and political sanctions in 2022.

Taking into account the above factors, the relevance of conducting an assessment of the probability of bankruptcy of the enterprise becomes relevant. To illustrate the financial stability of PJSC Lukoil, the probability of bankruptcy of the company is conducted using four forecasting models to maximize the accuracy of the study. Also, this analysis will help to understand how successfully the company has coped with the difficulties encountered in various periods of its operations in recent years, as well as to assess its current financial stability.

Estimation of bankruptcy probability using Chesser's model [2].

This model was elaborated by British scientist D. Chesser in 1974. It was originally created to assess the creditworthiness of borrowers in banks. Since its main purpose is to assess the risks of financial instability, when analyzing companies for the probability of bankruptcy, it takes into account many metrics such as liquidity, financial stability and others. Its main feature and advantage is the efficiency of assessment and ease of calculation.

Table 1

Calculation of bankruptcy probability by Chesser model [7]

Coefficient	2022	2021	2020	Formula
X <sub>1</sub>	0,1398	0,0916	0,0715	(Cash + Investments)/ Total assets
X <sub>2</sub>	9,0015	12,4070	2,6109	Revenue/(Cash + Investments)
X <sub>3</sub>	0,0002	-0,0653	-0,1616	(Current assets – Current liabilities)/ Total assets
X <sub>4</sub>	0,4461	0,5123	0,5532	(Long-term liabilities + Short-term liabilities)/ Total assets
X <sub>5</sub>	1,0000	1,0000	1,0000	Total equity/( Total assets – Long-term liabilities – Short-term liabilities)
X <sub>6</sub>	0,0002	-0,0574	-0,8652	(Current assets – Current liabilities)/Revenue
Z	-0,8452	0,1576	1,1141	$Z = -2,0434 - 5.24 * X_1 + 0.0053 * X_2 - 6.6507 * X_3 + 4.4009 * X_4 - 0.0791 * X_5 - 0.102 * X_6$
P	0,3004	0,5393	0,7529	$P = 1 / (1 + e^{-Z})$

By utilizing the Chesser`s model, one can assess the company's financial status based on the likelihood of bankruptcy. Table 2 contains the relevant benchmarks.

Table 2

Reference values for estimation of indicators based on Chesser`s model calculations

Probability of bankruptcy	Company's financial position
$0,8 < P < 1$	Critical financial position of the company
$0,6 < P < 0,8$	Company at risk of bankruptcy
$0,4 < P < 0,6$	Satisfactory financial condition of the company
$0,2 < P < 0,4$	The company's financial condition is good
$0 < P < 0,4$	The company's financial condition is excellent

Thus, the company's position is improving year by year. There is an increase in the amount of P, which indicates the strengthening of the financial position. In 2020

the paying capacity of the company was near bankruptcy, but the  $P_{2022}$  shows that the financial position of PJSC Lukoil is rather good.

Estimation of bankruptcy probability using of Altman's five-factor model [3]

The model was developed by American economist E. Altman in 1968. This model is widely used to assess the probability of bankruptcy of companies, as the author proposed different versions of the formula for organizations from different industries, taking into account their characteristics. Altman's model takes into account five key financial indicators of the company.

Table 3

Calculation of bankruptcy probability by Altman's five-factor model [7]

Coefficient	2022	2021	2020	Formula
$X_1$	0,0002	-0,0653	-0,1616	(Current assets-Current liabilities)/ Total assets
$X_2$	0,3459	0,3025	0,1143	Net income/Total assets
$X_3$	0,3874	0,3227	0,1125	Profit before tax/ Total assets
$X_4$	0,00000000399	0,00000000609	0,00000000542	Shares` market value/(Long-term liabilities + Short-term liabilities)
$X_5$	1,2582	1,1371	0,1868	Revenue/ Total assets
Z	3,0211	2,5474	0,5243	$Z = 1,2 * X_1 + 1,4 * X_2 + 3,3 * X_3 + 0,6 * X_4 + X_5$

To evaluate the results of the calculations, we present the reference values in Table 4.

Table 4

Reference values for estimation of indicators based on Altman's five-factor model calculations

Z value	Company's financial position
$Z > 2,9$	Financial sustainability zone (green zone)
$1,8 < Z < 2,9$	Uncertainty zone (gray zone)
$Z < 1,8$	Financial risk zone (red zone)

Basing on the calculations outlined in Table 3, the same pattern can be noted in the Altman five-factor model calculations as in the Chesser model: the financial position of PJSC Lukoil in 2020 was in the zone of financial risks, while in 2022 financial stability took hold, demonstrating a positive trend.

Estimation of bankruptcy probability using Belikov-Davydova model [4].

This model was proposed by A. Y. Belikov in 1998, I was one of the first domestic models. The uniqueness of this model is that it takes into account socio-political, financial and economic factors. This makes the model universal.

Table 5

Calculation of coefficients by Belikov-Davydova model [7]

Coefficient	2022	2021	2020	Formula
K <sub>1</sub>	0,0002	-0,0653	-0,1616	(Current assets – Current liabilities)/ Total assets
K <sub>2</sub>	0,6245	0,6204	0,2558	Net income/Equity and reserves
K <sub>3</sub>	1,2582	1,1371	0,1868	Revenue/Total assets
K <sub>4</sub>	-0,4426	-0,4113	-12,4261	Net income/Cost of sales
Z	0,4153	-0,1243	-8,9166	$Z = 8,38 * K_1 + K_2 + 0,054 * K_3 + 0,63 * K_4$

To estimate the results of the calculations, the reference values are presented in Table 6.

Table 6

Reference values for estimation of indicators based  
on Belikov-Davydova model calculations

Z value	Enterprise bankruptcy risk
$Z < 0$	maximum (90–100%)
$0 < Z < 0,18$	high (60–80%);
$0,18 < Z < 0,32$	medium (35–50%)
$0,32 < Z < 0,42$	low (15–20%)
$Z > 0,42$	minimal (up to 10%)

The analysis of the Z-value makes it clear that in 2020 the company was in a very difficult condition and was in the zone of maximum risk. However, its situation improved significantly in 2022, because then the probability of bankruptcy risk became low, almost minimal.

Estimation of bankruptcy probability using of Zaitseva`s model [5]

This model of bankruptcy forecasting was proposed by professor O. P. Zaitseva in 1998. It is based on factor analysis and static methods. It takes into account the risks and factors affecting the financial condition of the company.

Table 7

## Calculation of coefficients by Zaitseva`s model [7]

Coefficient	2022	2021	2020	Formula
K <sub>1</sub>	0,6994	0,6618	0,2519	Profit before taxation/Equity and reserves
K <sub>2</sub>	0,6296	0,7054	0,4307	Accounts payable/Accounts receivable
K <sub>3</sub>	2,9569	11,6207	38,6562	(Accounts payable + Borrowings)/Cash
K <sub>4</sub>	0,3079	0,2838	0,6025	Profit before tax/Revenue
K <sub>5</sub>	0,8055	1,0505	1,2382	(Non-current liabilities + Current liabilities)/Capital and reserves
K <sub>6</sub>	0,7948	0,8795	5,3540	Total assets/Revenue
K <sub>fact</sub>	1,0662	2,8241	8,6471	$K_{fact} = 0,25 * K_1 + 0,1 * K_2 + 0,2 * K_3 + 0,25 * K_4 + 0,1 * K_5 + 0,1 * K_6$
K <sub>standard</sub>	1,6579	2,1054		$K_{standard} = 1,57 + 0,1 * K_6 \text{ of last year}$

Concluding from the calculations presented in Table 7, it can be seen that  $K_{fact\ 2022} < K_{standard\ 2022}$ , which indicates a low probability of bankruptcy of the enterprise. In 2021  $K_{fact\ 2021} < K_{standard\ 2021}$ , which indicates a high probability of bankruptcy.

Taking into account the results of the above analysis, we can conclude that PJSC Lukoil experienced acute financial difficulties in 2020. However, the positive dynamics of indicators is clearly visible, and the risk of the probability of bankruptcy of the company has significantly reduced over the selected period of time. The company maintains a stable position in the oil and gas industry, constantly increasing the scale and volume of production. By applying an effective management strategy, PJSC Lukoil is on the way to achieving its goals.

To conduct an additional analysis of the strength of the company's financial position, let's analyze the financial and economic characteristics of PJSC Lukoil for the period 2020–2022 years.

Table 8

## Financial results of PJSC Lukoil for 2019–2022 years [7]

Indicator	Value, thousand rubles			Dynamics 2020/2022		Dynamics 2021/2022	
	2022	2021	2020	th. rub.	± %	th. Rub.	± %
Revenue	2 874 037 264	2 389 317 290	322 811 966	2 551 225 298	88,77%	484 719 974	16,87%
Profit from sales	936 067 229	708 678 659	275 872 981	660 194 248	70,53%	227 388 570	24,29%
Profit before taxation	884 893 070	678 184 595	251 481 889	633 411 181	71,58%	206 708 475	23,36%
Interest payable	15 378 428	41 907 753	10 088 913	5 289 515	34,40%	-26 529 325	- 172,51%

Net profit	790 120 077	635 708 387	197 559 111	592 560 966	75,00%	154 411 690	19,54%
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The company has very good indicators. Of course, this was influenced by the economic situation in the world due to the epidemiological situation.

The value of the revenue of PJSC Lukoil for 2022 amounted to 2,874,037,264 thousand rubles, which is lower by 2,551,225,298 thousand rubles (88%) of the 2020 revenue indicator, which is a positive trend. Revenue growth compared to 2021 was 16.87%.

The value of profit from sales was very low in 2020. For the period from 2020 to 2022, it increased by 70.53%, which is 660,194,248 thousand rubles. The growth from 2021 to 2022 amounted to 24.29% or 227,388,570 thousand rubles.

The net profit is also growing from year to year. Since 2020, it has grown by 592,560,966 thousand RUB, and from 2021 to 2022 by 154,411,690 thousand rubles, which is a good trend.

Then, the company's liquidity indicators is analyzed in Table 9.

Table 9

Liquidity indicators of PJSC Lukoil for 2019–2022 years [7]

Liquidity indicator	The value of the indicator			Dynamics		Calculation
	2022	2021	2020	2020 /2022	2021 /2022	
Current ratio	1,013	0,848	0,554	0,448	0,154	Current liquidity ratio = Current assets/Short-term liabilities
Quick Ratio	0,342	0,215	0,2	0,142	0,127	Quick Liquidity ratio = (Current Assets-Inventories)/Short-term liabilities
Cash ratio	0,338	0,086	0,025	0,312	0,252	Absolute liquidity ratio = (Cash + Short-term financial investments) /Short-term liabilities

Throughout the period under review, the current liquidity ratio is below the regulatory value. By the end of the period under review, it is still below the standard value, and is 1.003, but there is a positive trend. It grew by 0.154 compared to the previous year.

The rapid liquidity ratio is also not in the regulatory values, but positive dynamics can be traced. In 2022, the indicator is 0.342, which is 0.142 more than in 2021, and 0.127 more than in 2020.

But the absolute liquidity ratio is within the norm. Its positive dynamics are visible. It has grown by 0.312 since 2020, and by 0.252 since 2021.

The analysis of the profitability indicators presented in the Table 10 below.

Table 10

Profitability indicators of PJSC Lukoil for 2020–2022 years [7]

Financial indicator	Indicator values			Dynamics	
	2022	2021	2020	2020/2022	2021/2022
EBIT (thousand rubles)	998 260 000	720 092 348	241 022 238	757 237 762	278 167 652
Return on sales (ROS), %	32,60	29,70	85,50	-53	2,90
Return on equity (ROE), %	74,77	71,00	23,00	52	3,77
Return on assets (ROA), %	39,27	33,32	0,34	39	5,95

The profitability indicators presented in Table 10 have positive values. This is due to the profitable activity of the company. The return on sales in 2022 was 32.6%, which is 2.9% more compared to the previous year.

The EBIT indicator also has a positive trend. In the period from 2020 to 2022, it increased from the value of 241,022,238 thousand rubles to 998,260,000 thousand rubles, that is, by 757,237,762 thousand rubles.

Growth is also observed in the indicators of ROE and ROA, which increased by 3.77% and 5.95%, respectively, over the selected period.

Thus, the company's financial indicators have positive dynamics, which is a good factor.

By evaluating the probability of facing financial challenges, it becomes evident that PJSC 'LUKOIL' needs to prioritize the use of advanced technologies in advertising and refreshing production, and implementing economically efficient innovations. Additionally, the company is obligated to expand its operations into new markets, develop fuel stations, and address capacity overload issues. Considering these aspects, PJSC

Lukoil has the potential to become one of the most stable companies in the oil and gas sector, ensuring consistent business growth and transforming into a leading global energy organization, providing hydrocarbon supplies to the global market.

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