RISK MANAGEMENT OF MERGERS AND ACQUISITIONS WITH BORROWED CAPITAL IN THE ENERGY SECTOR

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ABSTRACT
Under the conditions of macroeconomic instability and the difficulty of forecasting trends in the market development, a competitive recovery of the electric power business is possible only by attracting large capital investment. Mergers and acquisitions deals that make it possible to concentrate assets and to amalgamate the industry business are done through the leveraged buy-out (LBO) scheme. However, LBO deals are associated not only with the investor's risks, but also with the risks of the acquirers and vendors. The article presents the authors' model of risks formalization of LBO deals. It allows for consolidating the blocks of key project and financial indicators, parameters of a specific risk, and macroeconomic and sectoral factors. The developed model yields an indicative assessment of the degree of risk of LBO deals taking into account the industry specifics. A mechanism for determining the position of the creditor in the framework of LBO is proposed as a practical application of this model. The results of the study can be used by the management of energy companies, investors and analysts in making financial decisions.
Keywords: energy, Leveraged Buy-Out (LBO), Mergers and Acquisitions (M&A) deals, risk management, risks, risks formalization.

1 INTRODUCTION

At the present time, the energy sector has a complex task of making a transition to a new higher level that provides for making the maximum contribution to dynamic socio-economic development. It involves a complex structural transformation: an increase in effectiveness of traditional and renewable energy use alongside with an increase in the rate of development and implementation of decentralized generation programs.

Mergers and acquisitions in the energy sector further the pooling of capital and the consolidation and stabilization of the market. However, such deals are not possible without debt financing and carry a high level of risk. Thus, there is a significant contradiction. On the one hand, M&A deals contribute to the stability of the energy market [1]. On the other hand, the high level of overall risk [2] discourages investors as it increases the probability of a loss of the invested capital, especially in mega-deals.

The authors therefore see it as an important task to develop a model that makes it possible to limit the investor's risk in the deals.

The outcome of this study is the authors' model capable of formalizing the existing typical and specific risks in M&A deals and of minimizing the level of investors risk limiting the volume of financing. The results have practical importance and are used for evaluating M&A deals of energy companies.

2 REVIEW OF RUSSIAN M&A DEALS IN 2015

Currently, the Russian M&A market is characterized by decreased activity and the weakening confidence of national companies in the effectiveness of such transactions. This is primarily due to the high level of macroeconomic instability that is caused by a reduction in oil prices and the difficulty and cost of obtaining additional financing.

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The year 20015 showed the worst results in the Russian M&A market over the past ten years. Total transactions decreased by 29% to $55.8 billion. This was due to a decrease in transaction volumes by 19% and a decrease in the average transaction size by 11% [3] (Fig. 1).

At the same time, the value of transactions in the global M&A market increased by 30% to $4.3 trillion with a slight decrease of 3% in the number of deals [3, 4] (Fig. 2).

Thus, the share of Russia in this market decreased to a minimum value of 1.3% compared with the average of 4.3% over the last decade. Cost analysis showed that 10 mega deals accounted for 45% of transactions in the Russian M&A market. It is above the global level by 26% [3]. Industry analysis of the M&A market showed that the energy industry continues to dominate in the Russian market. This is despite a decline in deal value from $33.1 billion to $16.3 billion and in total – from 73 to 58. The structural characteristics of the Russian M&A market by volume and number of deals by sector is presented in Figure 3.

The total list of the largest (incl. mega) M&A deals of the Russian energy market is demonstrated in Table 1.

The most expensive outbound transaction of the global M&A in 2015 was the acquisition by the Russian oil company Rosneft of a 49% stake in vendor Essar Oil Ltd for $2.4 million. A mega deal to acquire Russian assets by a foreign company took place between Silk Road Fund Co Ltd and Novatek.

Figure 1: Russian M&A deals (2010–2015) [3].

Figure 2: Global M&A deals (2010–2015) [3].

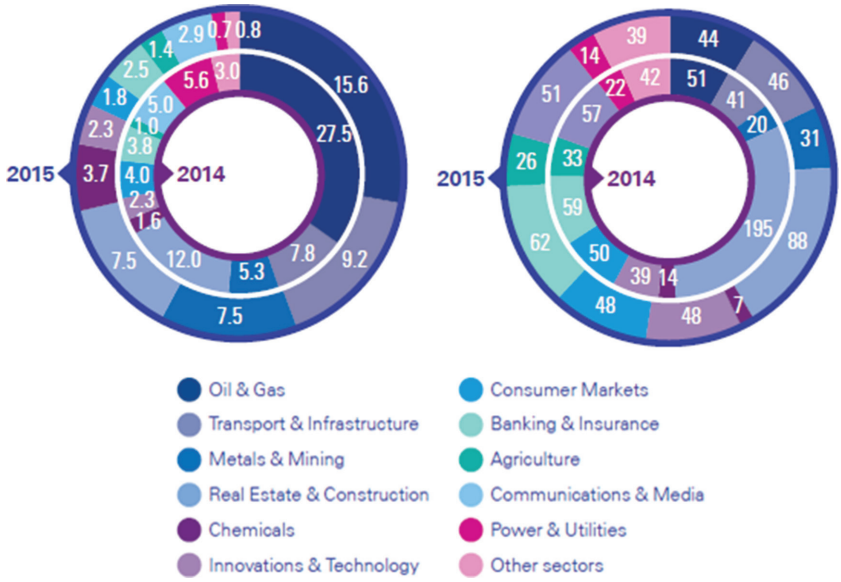

Figure 3: Russia M&A value and volume by sector (2014 & 2015) [4].

Table 1: M & A deals in the energy sector (2015).

Target	Acquirer	Vendor	% acquired	Value, USDm
Essar Oil Ltd	Rosneft Oil Company	Essar	49.0%	2,400
E.On E & P Norge	DEA Deutsche Erdoel AG (DEA)	E.On	100.0%	1,600
Yamal LNG	Silk Road Fund Co Ltd	Novatek	9,9%	1,400
SIBUR Holding	China Petrochemical Corporation (Sinopec Group	Leonid Mikhelson; Kirill Shamalov; Gennady Timchenko; former and current managers	10,0%	1,340
Vankorneft	ONGC Videsh Limited	Rosneft Oil Company	15,0%	1,300
RussNeft NK	Glencore plc	Mikhail Gutseriev	49,0%	900
Sulzer Ltd	Renova Group	Minority Shareholders	29.5%	1,032
Wish	DST Global	n/d	16,7%	500
ANI Technologies Pvt Ltd	DST Global; Tiger Global Management; Falcon Edge Capital LP; Softbank Corp; GIC Pte Ltd; Accel Partners; Rahul Mehta; Yuri Milner; Steadview Capital Management HK Ltd	n/d	16,7%	400

3 RISK CHARACTERISTICS OF M&A DEALS WITH LEVERAGED BUY-OUT (LBO) IN THE ENERGY SECTOR

M&A deals implemented on the basis of the LBO financing principles in the energy sector are accompanied by a significant number of risks. There are adverse influences of these risks on the company's financial standing. It contributes to a higher probability of default.

Transactions in the sphere of energy are characterized by an infinite number of risks. They are considered by the authors in the several papers [5–7].

Most risks in M&A deals [8] are based on the absence of the required synergistic effect, that is, a failure to reach the planned results of operations after consolidation. These risks apply to investment (1, 6), finance (2–4, 6), operating (5–6) and technical (6) business areas of the energy company. In addition, usually it is important to highlight a number of external hazards (7–8). In the framework of the studies, eight such risks were identified.

1. Revaluation of the acquired company;
2. Withdrawal of the assets of the consolidated company;
3. Decrease in the capitalization of the consolidated company (compared to the total capitalization of the two companies);
4. Risk of a reduction in the profits of the consolidated company;
5. Infrastructure risks: lower effectiveness of the transaction as a result of administrative errors in the integration:
   a. Loss of key employees,
   b. Deterioration of the corporate culture.
6. Industry-specific risks affect all areas of the company [9]. In particular, they can be caused by the emergence of technological changes in the industry [9];
7. Market risks involve additional losses due to the volatility of the global feedstock market and financial markets;
8. Political risks: emergence of a 'foreign policy setback' for the implementation of the deal by direct or indirect prohibition.

The distribution of risks along the curve of the M&A deal life cycle depending on the volume of attracted capital is presented in Figure 4.

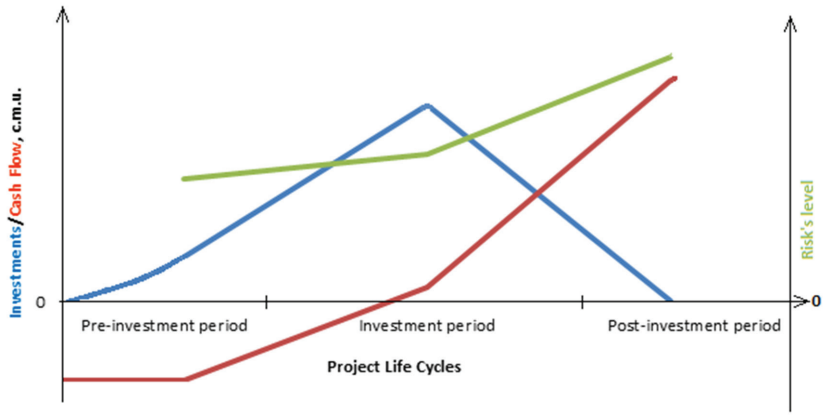

Figure 4: Distribution of risks by M&A life cycles.

It is important to note that for the acquirer in the sphere of energy business there is virtually no risk to business reputation of the vendor in this deal. This is primarily due to the capital intensity and inertia of the industry, and the practical impossibility of the emergence of new major players on the global energy market.

Taken together, these risks lead to the deterioration of the general financial condition of the acquiring company. Use of borrowed capital contributes to the occurrence of credit risk.

Prevention of the possibility of a default of the consolidated company requires prior forecasting of its condition. It must be based on the analysis of potential risks and calculation of the optimum ratio in investment terms: distribution of shares in the deal, its price and timing.

4 METHODICAL APPROACH TO RISKS FORMALIZATION OF M&A DEALS WITH LBO FOR AN ENERGY COMPANY

A significant stage in the risk modeling of the LBO deals is the formalization of key risk factors that define financial sustainability of the transaction.

4.1 Overview of the existing approaches

There is a sufficient number of widespread concepts of the modeling and selection of risks. The most popular of these include:

- *Microeconomic approach* – based on the hypothesis of the impact of the individual quantitative and qualitative deal characteristics and its participants on risk. Under this approach, special attention is paid to specific factors of the transaction (corporative and capital risks, financial risks of the company–vendor, tax, human risks, the probability of the absence of a synergistic effect, etc.).
- *Macroeconomic approach* – based on the influence of government differences on the default of the LBO deals. The approach is widespread in contemporary research. In the articles [10, 11] the authors show that such factors as the size of the capital market, the current development of legislation have a significant impact on the default risk of LBOs.
- *Market approach* – based on market prices of shares, bonds and derivative financial instruments for predicting the probability of LBOs default. The examples are the studies given in Refs. [12, 13]. The study [12] of credit spreads is based on the structural models of Merton. In Ref. [12], the authors investigated the dependence of CDS spreads on the activity in the LBO deals. As a result, it is concluded that the announcement of LBO deals leads to an increase in CDS spreads. The effectiveness of the market models application is shown in Ref. [13].

4.2 Blocks of indicators to risk formalization for an energy company

This paragraph presents the key risk factors grouped in four blocks.

1. *Block of project-financial indicators* determines the relationship between the LBO risk and the main financial parameters. The formation of this block is based on the project

approach to LBO deals. It includes methodologically accepted indicators [14] shown in Table 2. The specificity of the LBO is demonstrated by the use of the Debt/EBITDA indicator for characterizing the debt load of the consolidated company.
2. *Block of the specific risk indicators* allows for assessing specific risks in M&A (LBO) deals presented in Table 3.
3. *Block of macroeconomic and industry indicators* (Table 4) describe the impact of risks of the national economy and the state of the industry on the sustainability of LBO deals. Within this bock, in order to simplify the model, an integral index of national credit rating assigned by rating agencies only is used.
4. *Block of financial stress indicators* shows the potential impact of the specific risks of LBO deals on model stability including debt financing (Table 5).

Table 2: Key risks indicators of project-financial block.

Risk source	Indicator	Description
The risk to financial sustainability	DSCR	Minimum DSCR throughout the forecast period
The risk of project debt load	DEBITDA	Maximum Debt/EBITDA during the whole period of the project forecasting
Interest rate risk coverage	ISCR	Minimum ISCR throughout the forecast period
Net present value	NPV	Net Present Value of the project
Internal rate of return	IRR	Internal rate of return characterizes the discount rate
Discounted payback period	DPP	
The share of equity funds in the project	EQFN	Share of the investment budget, funded by the business owners.
The ratio of the loan amount and the market value of the collateral	LTV	The loan amount LBO/market value of shares offered as collateral packages (assets) of companies

Table 3: Key specific risks indicators block.

Risk source	Indicator	Description
The type of merger	MERG1 MERG2 MERG3	It characterizes the type of merger, depending on the character (dummy-variable): MERG1 – horizontal, MERG2 – vertical, MERG3 – other
Merger geography	MERG4 MERG5 MERG6	Enabled by means of a dummy-variable: MERG4 – regional, MERG5 – national, MERG6 – international
Due Diligence Implementer	MERG7 MERG8	Dummy-variable, which characterizes the level of Due Diligence: MERG7 – international auditing/consulting company, MERG8 – other

Table 4: Block of key macroeconomic and industry indicators.

Risk source	Indicator	Description
State of industry	SECEC1 SECEC2 SECEC3	It characterizes the current dynamics in the industry. Dummy variable: SECEC1 – presence of growth forecasts in the industry, SECEC2 – stable branch, SECEC3 – expected downturn in the industry, the reduction of the market.
The level of the national stock market	SECEC4	Stock market capitalization/GDP
Country risks	SECEC5 SECEC6 SECEC7	Indicator level of country risk is defined as a dummy variable national credit rating: SECEC5 - The rating of BBB and above, SECEC6 – rating from BB to BBB, SECEC7 – rated B and below.

Table 5: Block of key financial stress indicators.

Risk source	Indicator	Description
The risk of not achieving synergy	DSCRStr1	Stability of the model to achieve the unexpected of synergies. It is without taking into account the effect of the synergistic effect on cash flows.
Tax risk	DSCRStr2	Effect of potential tax risks in the fulfillment of obligations in the case of the ability to implement them. Defined as the minimum DSCR model to adjust the cash flow implications on tax risk (identified as a result of Due Diligence).
The risk of loss of key employees	DSCRStr3 DSCRStr4	Probability and impact of key personnel to the company. Dummy variables: DSCRStr3 – probability of leaving is low, DSCRStr4 - high impact of key personnel
The risk of joint/ corporate conflicts	DSCRStr5 DSCRStr6	Probability of joint conflict that could disrupt operations, recognition of the transaction invalid. Dummy variables: DSCRStr5 – high probability, DSCRStr6 – low probability.
Antitrust (administrative) risks	STR1 STR2	Dummy variable, which characterizes the degree of risk associated with anti-monopoly legislation: STR1 – anti-monopoly legislation violation risks are absent, or have obtained all relevant permits from antitrust authorities, STR2 – a high risk of violating antitrust laws.

4.3 Integration model of key risks indicator

Definition of the key risk factors is the basis for choosing the information and mathematical forms of relations between variable indicators. The most widely used forms are:

- Logit and probit-models (based on regression analysis);
- Methods of classification (cluster and discriminant analysis),
- Advanced information and cybernetic methods (neural networks, fuzzy sets, genetic algorithms, model based on Big Data).

In the framework of this study we used the logit-model presented by eqn (1):

$$PD = \frac{1}{1 + e^{-\Sigma_i b_i X_i}}, \quad (1),$$

where PD is the probability of an energy company's default in LBO deals; b_i is the coefficient of i-th factor; x_i is i-th indicator of the risk-factor model.

4.3.1 Results of risk indicator formalization

Due to the absence of sufficient statistic data, LBO business plans information, to solve the difficult problem of determining the factor coefficients the method of expert analysis was used.

The results of the coefficients evaluation are given in Table 6.

According to the analysis the greatest impact on the results are produced by the indicators of debt service coverage ratio (DSCR) and the debt load on the project (DEBITDA). It includes the sensitivity of the coverage to financial factors and qualitative stress.

5 METHODICAL APPROACH TO LIMITING THE INVESTOR MARKET SHARE IN M&A DEALS WITH LBO IN THE ENERGY SECTOR

This paragraph demonstrates a model for evaluation of LBO deals' risk. The main purpose of this model is to limit the risk born by the investors in the project.

Table 6: Coefficients of risks indicator formalization for the energy company.

Indicator	Tendency and strength of relation	Coefficient	Indicator	Tendency and strength of relation	Coefficient
DSCR	+++	–1,785	SECEC1	+++	–0,713
DEBITDA	--	0,927	SECEC2	+	–0,025
ISCR	+	–0,852	SECEC3	--	0,459
NPV	+	–0,006	SECEC4	+	–0,054
IRR	+	–0,008	SECEC5	++	–0,619
DPP	-	0,018	SECEC6	+	–0,080
EQFN	++	–0,237	SECEC7	-	0,107
LTV	+++	–0,194	DSCRStr1	+++	–1,284
MERG1	+	–0,085	DSCRStr2	++	–0,950
MERG2	++	–0,106	DSCRStr3	+	–0,302
MERG3	-	0,032	DSCRStr4	--	0,915
MERG4	-	0,167	DSCRStr5	---	1,162
MERG5	+	–0,082	DSCRStr6	+	–0,317
MERG6	+	–0,116	STR1	+	0,214
MERG7	++	–0,615	STR2	---	–0,850
MERG8	–	0,091			

5.1 Basic components of the model

There are the several characteristics of LBO deals' risk [7]:

PD – probability of default. A key indicator characterizing the LBO deal risk level and reflecting the potential probability of the investment project default.

LGD – loss given default. Expected average relative losses to be incurred by the company in case of the LBO deal default. In the case of default this portion of the investment project cost will be lost irrecoverably. The reason for introducing this indicator is that in the event of an LBO deal default it may be realized in full or in part by means of sale, insurance and option claims, etc.

EAD – exposure at default. This characterizes the absolute value of the LBO deal and is determined by the project's full actual or forecast capital, current and other costs.

5.2 Estimation model of limiting investor market share in LBO deal

If the LBO deal is implemented with the attraction of debt financing, it is the question of ensuring the stability of the investment organizations in terms of their participation in financing. It is so important because these projects are capital intensive and their implementation involves significant risks that could have a considerable impact on the capital and regulatory standards of these organizations.

The investor determines the risk level based on the maximum amount of the losses. It will lead to the disruption of operating activities by eqn (2):

$$NCAP = CCAP - TCAP, \tag{2}$$

where *NCAP* is the capital of the investor, the loss of which would not lead to insolvency; *CCAP* is the current energy company capital; *TCAP* is the target capital to cover overall risk of the energy company.

The volume of the target capital is evaluated using the credit rating of the energy company. Each credit rating may be assigned with a certain level of default probability corresponding to it depending on the forecasting horizon. One of the variants of correspondence between the credit rating and default probability is presented in Table 7 [5, 6].

The following limitation is the EAD volume. In this study, it is the potential volume of obligations of the acquirer (at the time of default). Therefore, the total maximum amount of creditor participation in the LBO budget can be defined as the minimum of the quantities by eqn (3):

$$Volume\ of\ investments = \min\left(NCAP; EAD\right). \tag{3}$$

Table 7: Correspondence between the probability of default and credit rating.

Rating	1-Y PD	3-Y PD	5-Y PD
AAA	0,008%	0,03%	0,1%
AA	0,04%	0,16%	0,28%
A	0,16%	0,4%	0,58%
BBB	0,3%	1,4%	3%
BB	1,15%	8,6%	15%
B	5,8%	15,4%	32,6%
CCC or lower	26,57%	45,5%	60%

Thus, the limiting market share of the investor can be determined by eqn (4):

$$IMS = \frac{\min\left(NCAP; EAD\right)}{BDG}, \quad (4),$$

where *IMS* is the market share of the investor in the LBO deal; *BDG* is the total LBO budget.

5.2.1 Additional components to investor limitation

The limiting market share of the investor can be corrected additionally. It depends on the level of risk (determined by the PD) and LGD. For the purposes of further indication, these indicators were put together based on the level of expected losses (EL) in eqn (5):

$$EL = PD \cdot LGD \quad (5)$$

Table 8 shows the distribution of the EL values, depending on the risk level.

Based on the EL-level, it is proposed that additional correction (K) to the LBO budget be implemented. The factor K allows for reducing the creditor market share in the deal with a high level of risk (Table 9).

The final outcome of this study is the summarized formula of the investor market share in the LBO deal. Equation (6) makes it possible to form a limit of the total borrowed capital in accordance with the deal risk level:

$$IMS_K = \frac{\min\left(NCAP; K \cdot EAD\right)}{BDG} \quad (6),$$

where IMS_K is the corrected value of *IMS*.

Table 8: *EL*-distribution by the probability of default (PD) and LGD.

LGD, %	**PD, %**							
	0–0,04	**0,05–0,16**	**0,17–0,3**	**0,31–1,15**	**1,16–5,8**	**5,81–26,57**	**26,58–50**	**50,01–100**
0,1–5	0,00%	0,01%	0,02%	0,06%	0,29%	1,33%	2,50%	5,00%
5,1–15	0,01%	0,02%	0,05%	0,17%	0,87%	3,99%	7,50%	15,00%
15,1–30	0,01%	0,05%	0,09%	0,35%	1,74%	7,97%	15,00%	30,00%
30,1–50	0,02%	0,08%	0,15%	0,58%	2,90%	13,29%	25,00%	50,00%
50,1–65	0,03%	0,10%	0,20%	0,75%	3,77%	17,27%	32,50%	65,00%
65,1–80	0,03%	0,13%	0,24%	0,92%	4,64%	21,26%	40,00%	80,00%
80,1–90	0,04%	0,14%	0,27%	1,04%	5,22%	23,91%	45,00%	90,00%
90,1–100	0,04%	0,16%	0,30%	1,15%	5,80%	26,57%	50,00%	100,00%

Table 9: Correspondence between the *K*-factor and *EL*-level.

EL	*0–0,05*	*0,06–0,1*	*0,11–0,15*	*0,16–0,3*	*0,31–0,7*	*0,71–1,2*	*1,21–2*	*2,1–3,5*
K	1	0,99	0,97	0,95	0,93	0,9	0,85	0,8
EL	*3,51–5*	*5,01–8*	*8,01–10*	*10,01–25*	*25,01–32*	*32,01–45*	*45,01–75*	*75,01–100*
K	0,75	0,65	0,5	0,35	0,1	0,005	0,0001	0

6 CONCLUSIONS

The important part in the risk assessment process is building a model that allows for a quantitative evaluation. At the next stages this model can be used for the purposes of measuring the risk, forming the cost and target capital yield, assessment of investors' sustainability [15].

This problem solution is proposed for the evaluation of the probability of default as an internationally accepted measure of credit risk. The introduced model includes the evaluation of deal-financial indicators, specific risks indicators, macroeconomic and sectoral indicators of financial stress. As the result of the integration of these indicators into the model, it is possible to obtain the overall risk indicator. In practice, it means the creditor market share in the total budget of the deal. A mechanism of reducing of the debt participation of a creditor in deals with a high level of risk.

The main directions of further research are:

- Formation of a statistical sample size on real LBOs. It will make it possible to replace expert opinion with a statistically reasonable measure of the coefficients.
- Explanation of the sensitivity level to calculate the EL-intervals to improve the quality of risk and *K*-factor.
- Econometric explanation of the EL-matrix.
- Development of a pricing model of the borrowed funds (taking into account the level of LBO risk).

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