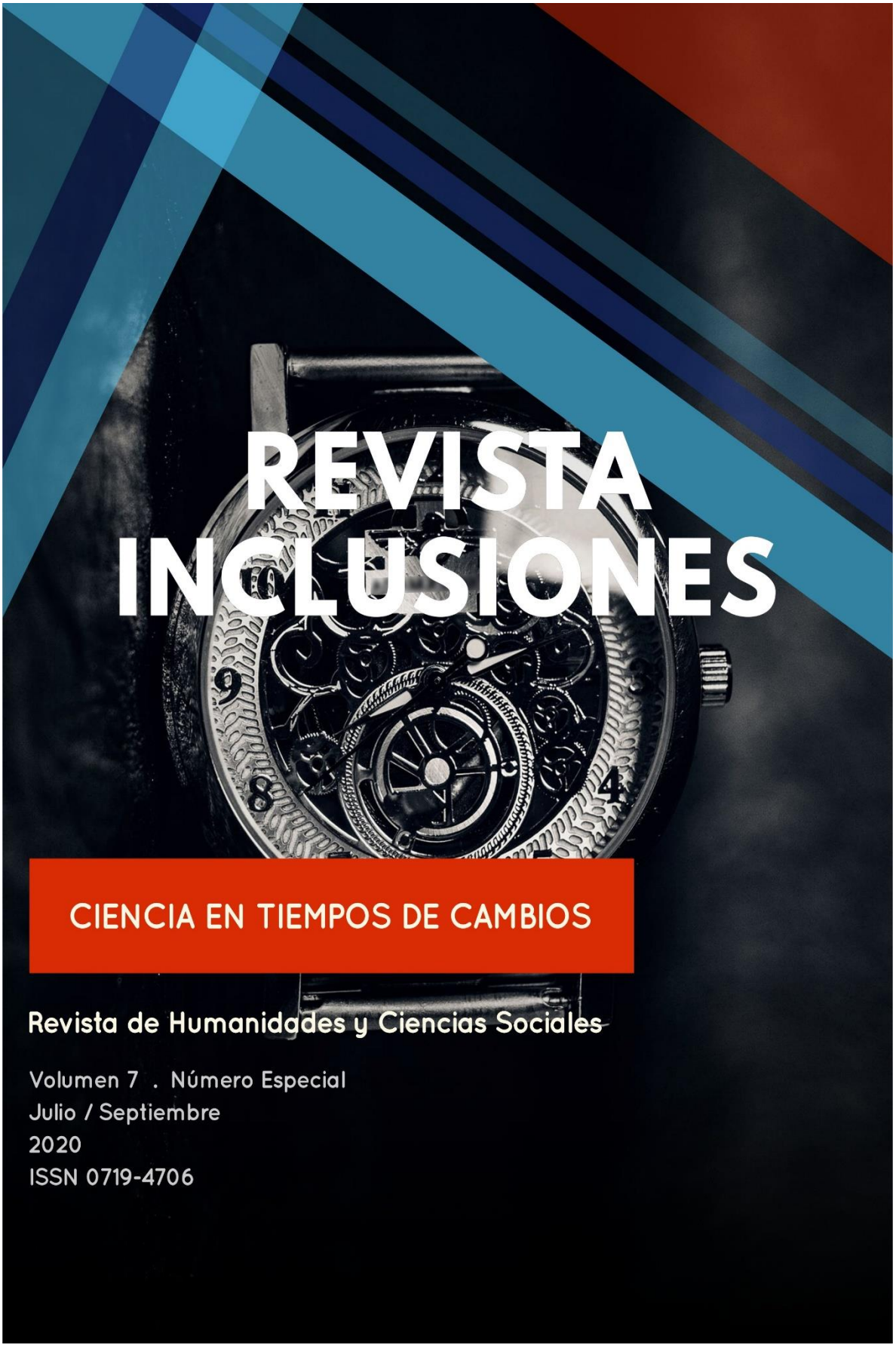

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FURTHER APPLICATION OF SCENARIO ANALYSIS WITHIN THE INCOME APPROACH TO APPRAISAL OF AN OIL COMPANY

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Abstract

The study is relevant because Russian companies invite foreign investors interested in growing cost of equity, while investment prospects depend on appropriate valuation of assets. The article aims to assess probable dynamics of a company's shares under various scenarios proceeding from the analysis of production factors influencing its value in the Russian market. Accordingly, the study used the scenario approach to forecast the company performance indicators under the optimistic, pessimistic and baseline scenarios. The work suggests an income approach-based business appraisal method supplemented with the analysis of the optimistic, pessimistic and baseline business development scenarios. Also, the results of this method applied to the valuation of an oil company are provided. The figures taken from its financial accounts as of 2012-2016 and analysed, formed the basis of three 5-year cash flow and value forecasts according to the different scenarios.

Keywords

Company value — Valuation — Appraisal — Discount rate — Equity net worth — Owner capital

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Introduction

The business of any company is based on equity as the material foundation of the modern economy formed and used within certain organisational structures and sectors.

Shareholders may dispose of all their company's property while any new business is created at certain costs. The real earning capacity of a company compared to the same of the same amount of banking capital gives the value used as a starting point of determination of the market price. This value may be identified as the company's market value.

In Russia, appraisal of all property is regulated by the Federal Law on Appraisal in the Russian Federation No. 135-FZ(ФЗ) of 29 July 1998 and the Federal Appraisal Standards – FAS (ФСО) approved by the Ministry of Economic Development of RF.

Russian legislation defines market value as "the most probable price at which the appraised property can be alienated in the open market given that the parties to the deal act reasonably and dispose of all the necessary information while the price of the deal is not affected by any extraordinary circumstances..."[1]

In developed countries, the concept of value is not conditioned upon the market since it is obviously determined by the elements and participants of the market.

Presently, standardisation, globalisation and more severe competition are characteristic of the markets. That is why the concept of "value" is gradually becoming a means to consolidate resources and efforts focusing on efficient management.

All that gives rise to definition of the market value in terms of the market capitalisation. The features mentioned above provide the basis for the concept of "market capitalisation of a company" implying an equivalent monetary valuation of all its property, financial assets, rights and benefits of the owner deriving from owning, using and disposing of the business.

The benefits of the owner are understood as various economic privileges or advantages related to creation of the added value by operation of the business. The market value of a company can be determined by special appraisal processes.

Therefore, the value of a company may be determined as an aggregative index capable to appropriately reflect its ability to satisfy various financial and economic interests of all participants of the company within itself as well as in its business environment.

The market value can also be determined from the point of view of the stock market as an aggregate price of all shares of the company in question.

Figure 1 shows the main production factors of the market value of a business.

[1] Federal Law on Appraisal in the Russian Federation of 29 July 1998 No. 135-FZ, from http: //www.consultant.ru/document/ cons_doc_LAW_19586.

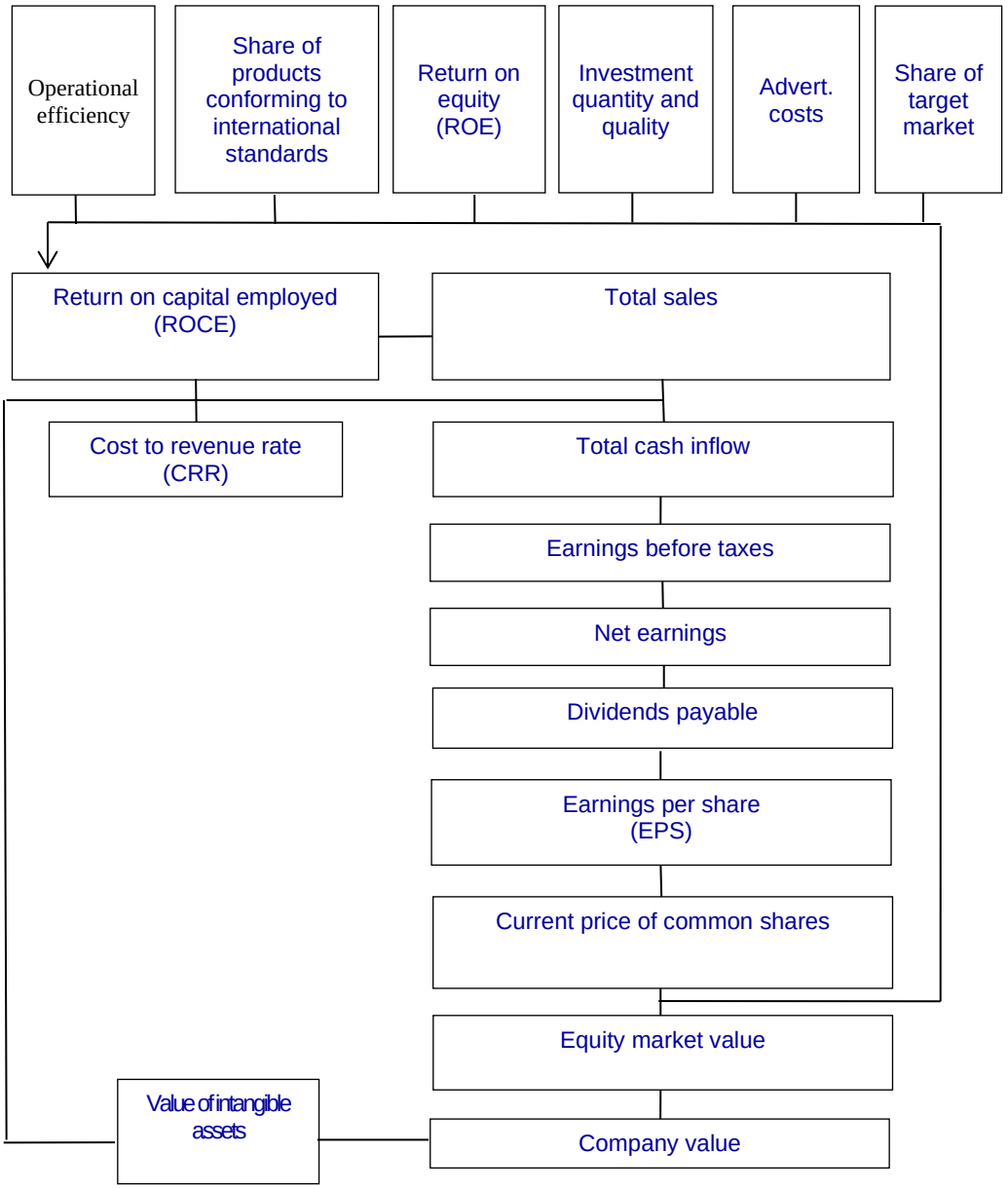

Figure 1
Derivative Factors of Market Value

While calculating the market value of a company, such influences shall be fully accounted for as:

- income generated by the evaluated property;
- risks inherent to generation of the income;
- average market performance of peers;
- peculiarities of the evaluated property to include obligations and elements;
- market situation;
- current economic situation and condition of the sector.

The value of a company may be influenced by its corporate governance. For

example, the interests of the owners may be very important to its value.

Potential investors are preoccupied with the company's performance prospects determined by analysis (whether the company is over- or undervalued by the market). To do so, one has to determine its intrinsic value and compare it with the current market price. Internationally, various business appraisal methods are used. They are grouped by approaches defined by indicators and tools used to appraise.

For example, Aswath Damodaran singles out the following approaches[2]:

- cash flow discounting;
- comparison with peers to find dependence of their value on a set of indicators;
- appraisal of conditional contracts (options).

The Russian Federal Standard of Appraisal No. 1 knows 3 approaches[3] based on:

- income, i.e. assessment of expected income from use of the property in question;
- comparison, i.e. prices of peers and comparison parameters;
- costs, i.e. the cost of creating a peer.

In the income flow, the value of the company (as well as of any of its assets) is a function of 3 variables:

- cash flows generated by the company (or its assets);
- degree of uncertainty of the prospect to receive those cash flows;
- time span from the time of investment to the start of those cash flows.

Informationally, the comparison approach is based on financial performance figures of the property and its peers as well as their market prices. The cost approach considers the current value of the business save for its debts.

The income and comparison approaches have been recognised and spread widely, while the cost one assesses the value of the property without regard to its ability to yield and its attractiveness to the market players. It does not require forecasts and extensive peer market data, which is why it is rather more sought out in the Russian market.

According to FSA No. 1, the business appraisal methodologies of V.A. Shcherbakov and N.A. Shcherbakova are presented here.[4] However, the team of authors of the Financial University at the Government of the Russian Federation led by Professors A.G. Griaznova and M.A. Fedotova supplements the standard approaches with the method of appraisal based upon the concept of economic profit and the optional method of business appraisal.[5]

[2] A. Damodaran, Investment Valuation: Instruments and Methods of Valuation of Any Assets. Translated from English (Moscow: ALPINA PABLISHER, 2014).
[3] Federal Standard of Appraisal "General Concepts of Appraisal, Approaches and Requirements to Results of Appraisal". Approved with order No. 297(25.05.2015) of Ministry of Economic Development RF, from http: //base.garant.ru/71034730.
[4] V. A. Shcherbakov, Appraisal of Businesses, (Moscow: Publishing House «Omega-L», 2012).
[5] A. G. Gryaznova and M. A. Fedotova, Business Appraisal – Manual (Moscow: Finansy I statistika. 2008), 736.

Materials and Methods

The study combines income approach (including cash flow discounting) to business appraisal and scenario analysis to forecast resulting indicators of appraised property.

Depending on the share of borrowed funds in liabilities, free cash flow to equity (FCFE) or to the firm (FCFF) may be preferred. This study uses FCFF.

The most common FCFF formula is as follows:

$$FCFF = EBIT * (1 - tc) + D\&A - CapEx - ChangeinNWC \quad , \qquad (1)$$

However, a different version was chosen for the model:

$$FCFF = EBITDA - Taxes - CapEx - ChangeinNWC \quad , \quad (2)$$

Both give nearly the same result the 2nd one being more suitable for a hind-sight analysis because taxes paid in respect of expired periods are already known.
At the next phase, a discount rate shall be calculated for the present value method to be used.

Economically, discount rate is the return on comparably risky investments required by investors.

Depending on the chosen cash flow model, the build-up method, capital assets pricing model (CAPM) or weighted average cost of capital (WACC) is used.

Since the FCFF was chosen for the model, the discount rate is determined by the weighted average cost method. The matters of discount rate and capital cost calculation were explored by F. Modigliani, M. Miller and S.C. Mayers[6], as well as by P. Brussov, T. Filatova and N. Orekhova[7]. Since the dividend policy of the company does not provide for mandatory payments every year, the cost of capital is suggested to be determined by the capital assets pricing model (CAPM) being a return on capital expected by investors. In more detail, the matter of the cost of equity is considered in[8]

[6] F. Modigliani and M. Miller, "The Cost of Capital, Corporate Finance, and the Theory of Investment", American Economic Review Vol: 48 num 4 (1958): 261-297; F. Modigliani and M. Miller, "Corporate Income Taxes and the Cost of Capital: a Correction" American Economic Review Vol: 53 num 3 (1963): 147-175; F. Modigliani and M. Miller, "Some estimates of the cost of capital to the Electric Utility Industry 1954-1957", American Economic Review (1966): 261-297; S. C. Mayers, "The Capital Structure Pussle", Journal of Finance, July (1984) y S. C. Mayers and N. S. Majluf, "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have", Journal of Financial Economics num 13 (1984).

[7] Pet. Brussov; T. Filatova; N. Orekhova and N. Brussova, "Weighted average cost of capital in the theory of Modigliani-Miller, modified for a finite lifetime company", Applied Financial Economics num 21 (11) (2011): 815-824; Pet. Brussov; T. Filatova; N. Orekhova; M. Eskindarov; Pav. Brussov and N. Brussova, "Influence of debt financing on the effectiveness of the finite duration investment project", Applied Financial Economics num 21 (11) (2011): 1043-1052 y Pet. Brussov; T. Filatova; N. Orekhova and N. Brussova, "Weighted average cost of capital in the theory of Modigliani-Miller, modified for a finite lifetime company", Applied Financial Economics num 21 (11) (2011): 815-824.

[8] T. V. Filatova; N. P. Orekhova and A. P. Brussova, "Weighted average cost of capital in the theory of Modigliani-Miller, modified for a finite lifetime company", Vestnik FA num 4 (2008): 74-77.

$$Dr = Rf + \beta * (Rm - Rf + Rc), \quad (3)$$

Where Rf – riskless rate

β – beta coefficient

(Rm-Rf) – market risk premium, i.e. the difference between expected performance of the market portfolio and riskless rate

Rc – country risk premium

WACC discount rate determined as:

$$DR = WACC = k_d \cdot (1 - t_c) \cdot W_d + k_s \cdot W_s, \quad (4)$$

where Ws – share of shareholder equity in the capital structure

kd – cost of debt
tc – corporate income tax rate
Wd – share of debt in the capital structure
ks – cost of the shareholder equity (common shares)

One of the most important components of the final cost in the model is terminal value determined as EBITDA of the post-forecast period multiplied by the current EV/EBITDA multiplier. To know it, Current EV has to be determined adjusted by market capitalisation, net debt and market value of the non-controlling shares. To do so, formula 5 was used.

$$EV = \mathbf{Capitalisation} + Netdebt + NCI \quad , \quad (5)$$

where NCI – non-controlling shares

Next, the terminal multiplier is determined as a relation of EV to EBITDA for the closest finished period. Finally, all the cash flows and terminal value are discounted to give the final cost of the appraised property save for some peculiarities.

All calculations related to forecasting the property's operations were made under three scenarios:

- baseline (where the current dynamics of the indexes remains the same);
- optimistic (where it is positive);
- pessimistic (where the growth decelerates or turns to a recession).

To receive the final totals, weighted arithmetic average was used with probabilities of each of the scenarios used as weights.

Financial accounts of Rosneft as of 2012-2016[9] were taken as the source.

[9] Rosneft Financial Accounts 2016, from https://www.rosneft.ru/upload/site1/document_cons_report/MDA_RUS_4Q2016_CL.pdf.; Rosneft Financial Accounts 2015, from

Findings

The study combines cash flow discounting and scenario analysis to suggest a new method of company appraisal by which the value of Rosneft Joint-Stock Company was explored.

The appraisal is based upon the hind-sight analysis since any long-term analysis requires historic materials to be explored.

Table 1 shows historic financial indicators over las 5 years[10] to calculate the cash flow of all the invested capital.

Indicator	Time period				
	2012	2013	2014	2015	2016
Earnings, bnroubles	3,089	4,694	5,503	5,150	4,988
Earnings growth rate, %	13.6,	52.0	17.2,	-6.40	-3.10
Production cost, bnroubles	1,937	3,004	3,601	3,035	2,901
Gross income, bnroubles	1,152	1,690	1,902	2,115	2,087
Gross margin, %	37.3%	36%	34.6%	41.1%	41.8%
EBITDA, bnroubles	618	947	1,057	1,158	1,144
EBITDA/Earnings, %	20.0	20.2	19.2	22.5	22.9
EBIT, bnroubles	412	555	593	708	662
EBIT/Eearnings, %	13.3%	11.8%	10.8%	13.7%	13.3%

Table 1
Retrospective Financial Indicators 2012-2016

The Table shows earnings decreasing during the last 2 years by 6.4% and 3.1%, respectively. Over this period of time, earnings' growth averaged 14.7% and median growth was 13.6% while the annual average was 12.7%.

It was decided to commence cash flow calculation with EBITDA given its average margin of 21% and median margin of 20.2% over the last 5 years.

The forecast was made for 5 years under the baseline, optimistic and pessimistic scenario. Each of the three forecasts is based upon earnings, cost of production and EBITDA. Baseline scenario indicators are provided in Table 2. This scenario implies normal operation without sharp fluctuations of financial performance. The growth of earnings is at 3% over the whole period with further gradual decrease by 0.3% per year since 2018 which would give annual growth of earnings at 2.8%. The gross margin was admitted at 38% which

https://www.rosneft.ru/upload/site1/document_cons_report/Rosneft_FS_4Q_2015_RUS.pdf.; Rosneft Financial Accounts 2014, from https://www.rosneft.ru/upload/site1/document_cons_report/174094/qOAluBrAEf.pdf y Rosneft Financial Accounts 2013, from https://www.rosneft.ru/upload/site1/document_cons_report/BvlrgLMvua.pdf.

[10] Rosneft Financial Accounts 2016, from https://www.rosneft.ru/upload/site1/document_cons_report/MDA_RUS_4Q2016_CL.pdf.; Rosneft Financial Accounts 2015, from https://www.rosneft.ru/upload/site1/document_cons_report/Rosneft_FS_4Q_2015_RUS.pdf; Rosneft Financial Accounts 2014, from https://www.rosneft.ru/upload/site1/document_cons_report/174094/qOAluBrAEf.pdf. y Rosneft Financial Accounts 2013, from https://www.rosneft.ru/upload/site1/document_cons_report/BvlrgLMvua.pdf.

is the historic period's average. Similarly, the EBITDA margin was based on the last 5-year average.

Indicator	Time period				
	2017	2018	2019	2020	2021
Earnings, bnroubles	5,137.6	5,276.4	5,418.8	5,565.1	5,715.4
Earnings growth rate, %	3.0	2.7	2.4	2.1	1.8
Production cost, bnroubles	3,185.3	3,271.3	3,359.7	3,450.4	3,543.5
Gross income, bnroubles	1,952.3	2,005	2,059.2	2,114.7	2,171.8
Gross margin, %	38	38	38	38	38
EBITDA, bnroubles	1,078.9	1,108.03	1,137.95	1,168.68	1,200.23
EBITDA/Earnings, %	21	21	21	21	21

Table 2
Baseline Forecast

Optimistic forecast figures are given in Table 3.

Indicator	Time period				
	2017	2018	2019	2020	2021
Earnings, bnroubles	5,237.4	5,483.6	5,686.4	5,896.8	6,115.0
Earnings growth rate, %	5.0	4.7	4.4	3.7	3.7
Production cost, bnroubles	3,142.4	3,191.4	3,309.5	3,420.2	3,607.9
Gross income, bnroubles	2,095.0	2,292.1	2,376.9	2,476.7	2,507.2
Gross margin, %	40.0	41.8	41.8	42.0	41.0
EBITDA, bnroubles	1,152.2	1,206.4	1,364.7	1,474.2	1,528.8
EBITDA/Earnings, %	22	22	24	25	25

Table 3
Optimistic Forecast

The Optimistic forecast implies stable growth of basic performance indicators in foreseeable future. The scenario uses earnings growth of 5% with its decrease by 0.3% a year since the second year. Thus, the average annual growth would be 4.2%. The gross margins were admitted at 40% in the first year of the forecast which is slightly higher than the last 5-years average. It grows to 41% by the end of the forecast period. The EBITDA margins was taken 22% to increase gradually to 25%. Pessimistic scenario data are provided in Table 4.

Indicator	Time period				
	2017	2018	2019	2020	2021
Earnings, bnroubles	4,888.2	4,790.5	4,742.6	4,695.1	4,718.6
Earnings growth rate, %	-2.0	-2.0	-1.0	-1.0	0.5
Production cost, bnroubles	3,177.4	3,161.7	3,177.5	3,145.7	3,114.3
Gross income, bnroubles	1,710.9	1,628.8	1,565.0	1,549.4	1,604.3
Gross margin, %	35	34	33	33	34
EBITDA, bnroubles	938.5	871.9	815.7	807.6	858.8
EBITDA/Earnings, %	19.2	18.2	17.2	17.2	18.2

Table 4
Pessimistic Forecast

The pessimistic forecast implies lowering performance in the nearest future. The earnings decrease by 2.0% a year to change for a growth at 0.5% in the last year. The growth margin decreases from 35.0% in 2017 to 34.0% in 2021 while EBITDA does the

same from 19.2% in 2017 (which is 1 percentage point below the last 5-years median) to 18.2% in 2021.

To calculate a cash flow correctly, one should consider changes in the working capital. These changes were calculated under three scenarios for the forecast and historic periods.

The working capital calculation did not include cash and cash equivalents because it was important to understand the dynamics of demand of the business for them and whether the company would need to invest them back in its day-to-day operation or the capital would decrease with the growth of sales. Besides operation, cash may be spent for investment or financial transactions. In this model, information about the company's operation is used.

Table 5 shows changes in the working capital over historic period[11].

Indicator	2013	2014	2015	2016
Accounts receivable	178	139	-187	118
Inventories	68	31	-14	64
Advances made	145	74	-133	22
Accounts payable	277	6	-18	107
Tax liabilities	82	29	-55	82
General effect on cash flow	-32	-209	261	-15

Table 5

Changes in Working Capital Components over Historic Period, bnroubles.

As it appears from Table 5, in 2013, 2014 and 2016, changes in the working capital had a negative impact on the cash flow. They led to its increase only in 2015.

Table 6 gives working capital items as a percentage of earnings save for accounts payable related to the cost of production because they do not depend directly on earnings but rather on goods and services bought from the suppliers. Proceeding from that data, average and median values of all the items were determined over the last 5 years (see Table 7).

Indicator	2012	2013	2014	2015	2016
Accounts receivable, %	7.7	8.8	10.1	7.1	9.7
Inventories, %	4.3	4.3	4.2	4.3	5.7
Advances made, %	6.0	7.0	7.3	5.3	5.9
Accounts payable, %	10.9	16.2	13.7	15.7	20.1
Tax liabilities, %	2.9	3.7	3.7	2.8	4.6

Table 6

Working Capital Items as a Percentage of Earnings and Cost of Production

[11] Rosneft Financial Accounts 2016, from https://www.rosneft.ru/upload/site1/document_cons_report/MDA_RUS_4Q2016_CL.pdf.; Rosneft Financial Accounts 2015, from https://www.rosneft.ru/upload/site1/document_cons_report/Rosneft_FS_4Q_2015_RUS.pdf; Rosneft Financial Accounts 2014, from https://www.rosneft.ru/upload/site1/document_cons_report/174094/qOAluBrAEf.pdf y Rosneft Financial Accounts 2013, from https://www.rosneft.ru/upload/site1/document_cons_report/BvlrgLMvua.pdf

Item	Average	Median
Accounts receivable, %	8.7	8.8
Inventories, %	4.6	4.3
Advances made, %	6.3	6.0
Accounts payable (% ofCOP)	15.3	15.7
Tax liabilities, %	3.5	3.7

Table 7
Working Capital Items' Averages and Medians as a Percentage of Earnings and Cost of Production in Historic Period

To the capital items' values, the following shares were chosen:

- accounts receivable – 8.7% of earnings (average);
- inventories – 4.6% of earnings (average);
- advances made – 6.3% of earnings (average);
- accounts payable – 15.3% of production cost (average);
- advance payments – 16.1% of earnings (median);
- tax liabilities – 3.7% (median).

Proceeding from that, values of the working capital items were forecasted along with their overall influence on the cash flow under the three scenarios. Table 8 is for the baseline one.

Indicator	2017	2018	2019	2020	2021
Accounts receivable	446.4	458.3	470.7	483.4	496.4
Inventories	234.3	240.6	247.1	253.8	260.6
Advances made	323.6	332.4	341.4	350.6	360.0
Accounts payable	488.2	501.4	514.9	528.9	543.1
Tax liabilities	187.7	192.7	197.9	203.3	208.8
Changes in accounts receivable	-38.7	12.0	12.4	12.7	13.1
Changes in inventories	-48.7	6.3	6.5	6.7	6.9
Changes in advances made	30.6	8.7	9.0	9.2	9.5
Changes in accounts payable	-94.8	13.2	13.5	13.9	14.3
Changes in tax liabilities	-40.3	5.1	5.2	5.3	5.5
Influence on cash flow	-193.93	45.6	46.59	47.84	49.14

Table 8
Forecasted Values of Working Capital Items and their Influence on Cash Flow under Baseline Scenario, bn roubles

In the first forecast period, the change in the working capital evidently decrease the cash flow which is due to averaging of the items to earnings. However, later on the cash flow increase because of the changes in the working capital.

Table 9 gives forecasted values of working capital items under optimistic scenario.

Thus, the cash flow increases gradually since the second year of the forecast due to the working capital changes. In the first year, their influence on the cash flow is negative also due to the averaging of particular items' shares in earnings and production cost. The influence on the cash flow totals 99.57 bn roubles.

Indicator	2017	2018	2019	2020	2021
Accounts receivable	454.9	476.3	493.9	512.2	531.2
Inventories	238.8	250.1	259.3	268.9	278.9
Advances made	329.9	345.4	358.2	371.5	385.2
Accounts payable	481.7	489.2	507.3	524.2	553.0
Tax liabilities	191.3	200.3	207.7	215.4	223.4
Changes in accounts receivable	-30.1	21.4	17.6	18.3	19.0
Changes in inventories	-44.2	11.2	9.3	9.6	9.9
Changes in advances made	36.9	15.5	12.8	13.3	13.7
Changes in accounts payable	-101.3	7.5	18.1	17.0	28.8
Changes in tax liabilities	-36.7	9.0	7.4	7.7	8.0
Influence on cash flow	-175.36	64.61	65.17	65.77	79.38

Table 9
Forecasted Values of Working Capital Items and their Influence on Cash Flow under Optimistic Scenario, bn roubles

Pessimistic scenario working capital forecast is provided in Table 10. Changes in the working capital have a negative influence here save for the last year where there is no such influence.

The working capital changes data allow to proceed to the calculation of cash flow.

Indicator	2017	2018	2019	2020	2021
Accounts receivable	424.6	416.1	411.9	407.8	409.9
Inventories	222.9	218.5	216.3	214.1	215.2
Advances made	307.9	301.8	298.8	295.8	297.2
Accounts payable	487.0	484.6	487.0	482.2	477.3
Tax liabilities	178.5	175.0	173.2	171.5	172.4
Changes in accounts receivable	-60.4	-8.5	-4.2	-4.1	2.0
Changes in inventories	-60.1	-8.5	-2.2	-2.2	1.1
Changes in advances made	14.9	-4.5	-3.0	-3.0	1.5
Changes in accounts payable	-96.0	-6.2	-2.4	-4.9	-4.8
Changes in tax liabilities	-49.5	-2.4	-1.7	-1.7	0.9
Influence on cash flow	-251.01	-3.6	-8.69	-15.87	0.62

Table 10
Forecasted Values of Working Capital Items and their Influence on Cash Flow under Pessimistic Scenario, bn roubles

Appraisal of businesses uses one of the two cash flow models:

- free cash flow to equity (FCFE); and
- free cash flow to the firm (FCFF).

Equity cash flow provides the basis for calculation of a company's net worth. The sum of equity and long-term debt enables to determine the total market value of the company's owner's equity and its long-term indebtedness.

For example, in 2016, the share of Rosneft's borrowed capital is 66.22%, which means that the company borrows heavily over 30%. That is why, the calculation was made for the whole invested capital – FCFF.

Next, in order to bring the value of future cash flows to the present, the discount rate must be determined.

Because of the choice of FCFF, the discount rate is calculated with WACC.

Since the dividend policy of the company does not provide for mandatory payments every year, the cost of capital is suggested to be determined by the capital assets pricing model (CAPM).

For the riskless rate, the long-term governmental bonds rate was taken being then 8.45%. The market and country risk premiums were taken from the table of AswathDamodaran calculating those premiums annually for most of the countries in local currencies. The values in question were 9.24% and 2.56%, respectively.[12]

The beta coefficient was calculated using prices provided by the company itself in comparison with the MISE (Moscow International Stock Exchange) index. It was -0.0042 which means a practical absence of correlation between the prices of the company and the market as a whole.

Rosneft's shareholder equity values calculated by Formula 3 are provided in Table 11.

Indicator	Value
Riskless rate	8.45%
Market risk premium	9.24%
Country risk premium	2.56%
Beta coefficient	-0.0042
Shareholder equity	8.4%

Table 11
Equity Cost Determined with CAPM

To determine the share of shareholder equity the model used its market value since the latter and the reported value of a company's capital may differ significantly. The final discount rate calculation is provided in Table 12.

Indicator	%
Equity determined with CAPM	8.4
MVEquity/TotalCapital	33.8
Borrowed capital	6.6
MV Debt/TotalCapital	66.2
Tax rate	20
Dr	6.3

Table12
Discount Rate Determined with WACC

Thus, the WACC-determined cash flow discount rate is 6.3%.

One of the elements of a cash flow is capital expenditure (CapEx). For this study, capital expenditure values provided in Table 13 below were accepted as a percentage of earnings.

[12] Country Default Spreads and Risk Premiums, from http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html (30.05.2017).

Scenario	2017	2018	2019	2020	2021
Baseline	12	12	11	10	10
Pessimistic	14	14	13	12	12
Optimistic	8	8	5	6	6

Table 13
Capital Costs over Forecast Period as a Percentage of Earnings

Each year's amortisation was calculated with regard to that of the previous year and the previous year's amortisation of capital investments. Tax liabilities were determined via EBIT (with percentages at the level of 2016) by deducting percentages from EBIT and multiplying by effective tax rate which was 36.6% in 2016.

The resulting data enable to calculate cash flows for the historic and the forecast period. As to the historic one, see Table 14.

Indicator	2013	2014	2015	2016
EBIT	555	593	708	662
EBITDA	947	1,057	1,158	1,144
Interests	63	96	137	143
Taxes	81	128	104	116
EBI (UNI)	474	465	604	546
+ Amortisation	392	464	450	482
- CapEx	560	533	595	709
+/- Changes in Working Cap.	-32	-209	261	-15
FCFF	274	187	720	304

Table 14
Cash Flows over Historic Period

Similarly, cash flows over forecast periods are determined.

Indicator	2017	2018	2019	2020	2021
EBIT	537.3	514.7	491.4	472.1	456.9
EBITDA	1,078.9	1,108.0	1,138.0	1,168.7	1,200.2
Interests	143	143	143	143	143
Taxes	144.3	136.0	127.5	120.4	114.9
EBI (UNI)	393.0	378.7	363.9	351.7	342.0
+ Amortisation	541.6	593.3	646.5	696.6	743.3
- CapEx	616.5	633.2	596.1	556.5	571.5
+/- Changes in Working Cap.	-191.9	45.36	46.59	47.84	49.14
FCFF	126.2	384.2	461.0	539.6	563.0

Table 15
Cash Flows under Baseline Scenario, bnroubles

Under the baseline scenario, cash flow is increasing smoothly while the value and share of FCFF in earnings are getting even. Cash flow is positive over the whole forecast period.

Table 16 shows cash flow composition for the optimistic scenario.

Indicator	2017	2018	2019	2020	2021
EBIT	610.7	603.2	697.1	744.5	739.6
EBITDA	1,152.2	1,206.4	1,364.7	1,474.2	1,528.8
Interests	143	143	143	143	143
Taxes	171.1	168.4	202.8	220.1	218.3
EBI (UNI)	439.5	434.8	494.3	524.4	521.3
+ Amortisation	541.6	603.1	667.6	729.7	789.2
- CapEx	733.2	767.7	739.2	707.6	733.8
+/- Changes in Working Cap.	-175.4	64.61	65.17	65.77	79.38
FCFF	72.5	334.9	487.9	612.3	656.0

Table16
Cash Flows under Optimistic Scenario, bnroubles

Under the optimistic scenario, cash flow also gets even and growth staying positive over the whole forecast period. However, the average annual growth is higher than under the baseline one: 16.6% against 13.1%. The share of cash flow in earnings is noticeably higher as well reaching 11.5% in 2021.

Finally, Table 17 sets out formation of the cash flows under the pessimistic scenario.

Indicator	2017	2018	2019	2020	2021
EBIT	397.0	297.5	209.1	181.0	208.6
EBITDA	938.5	871.9	815.7	807.6	858.8
Interests	143.0	143.0	143.0	143.0	143.0
Taxes	92.9	56.5	24.2	13.9	24
EBI (UNI)	304.0	240.9	184.9	167.1	184.6
+ Amortisation	541.6	574.4	606.6	626.5	650.2
- CapEx	391.1	383.2	237.1	281.7	283.1
+/- Changes in Working Cap.	-251.0	-25.1	-8.7	-15.9	0.62
FCFF	203.5	407.0	545.7	496.1	552.3

Table 17
Cash Flows under Pessimistic Scenario, bnroubles

Under the pessimistic scenario, last years' cash flows are smaller than under the baseline one giving smaller terminal value for further calculations. The share of cash flow has no trend while becoming more averaged. In 2021, it makes 9.7% of the earnings.

As of 1 June 2016, Rosneft capitalised at 3,190 bn roubles[13] with 1,890 bn roubles of net debt as of 1 January 2017 and market value of non-controlling interest of 402 bn roubles. EV was determined at 5,482 bn roubles. Next, the terminal multiplier was determined by division of EV by EBITDA of the closest historic period making 4.8x. At this phase, it is possible to calculate total values as sums of discounted cash flows and discounted terminal value of the company in the post-forecast period. Thus, the WACC rate of 6.3% and EV/EBITDA multiplier of 4.8x gave the values set out in Table 18.

[13] Rosneft Financial Accounts 2016, from https://www.rosneft.ru/upload/site1/document_cons_report/MDA_RUS_4Q2016_CL.pdf.

Indicator	Baseline	Optimistic	Pessimistic
Cash flows PV, bn roubles	1,697.7	1,733.4	1,801.2
Terminal value PV, bn roubles	4,243.9	5,405.5	3,036.6
Company total value	5,924	7,140	4,839
Equity total value, bn roubles	3,632	4,848	2,547
Value of shares, roubles	343	457	240

Table18
Rosneft Shares Valuation According to DCF under Three Scenarios, bn roubles

With classic probability distribution for all the three scenarios as follows:

- baseline – 50%;
- optimistic – 25%;
- pessimistic – 25%;

the weighted average value of the Company (CV) is

$$CV = 5{,}924 \cdot 0.5 + 7{,}140 \cdot 0.25 + 4{,}839 \cdot 0.25 = 5{,}956.75 \text{ bn roubles}$$

while the average value of a share (SV) is

$$SV = 343 \cdot 0.5 + 457 \cdot 0.25 + 240 \cdot 0.25 = 345.75 \text{ roubles/share}$$

In the current year, Rosneft share prices varied from 294.4 to 425.1 roubles/share reflecting moderate market expectations. However, the graph over January-October 2017 shows, that whereas optimistic expectations prevailed in the beginning of the year, prices sloped sharply down in February-March. During the next half, they had not managed to reach the baseline inclining to the pessimistic scenario (Figure 2).

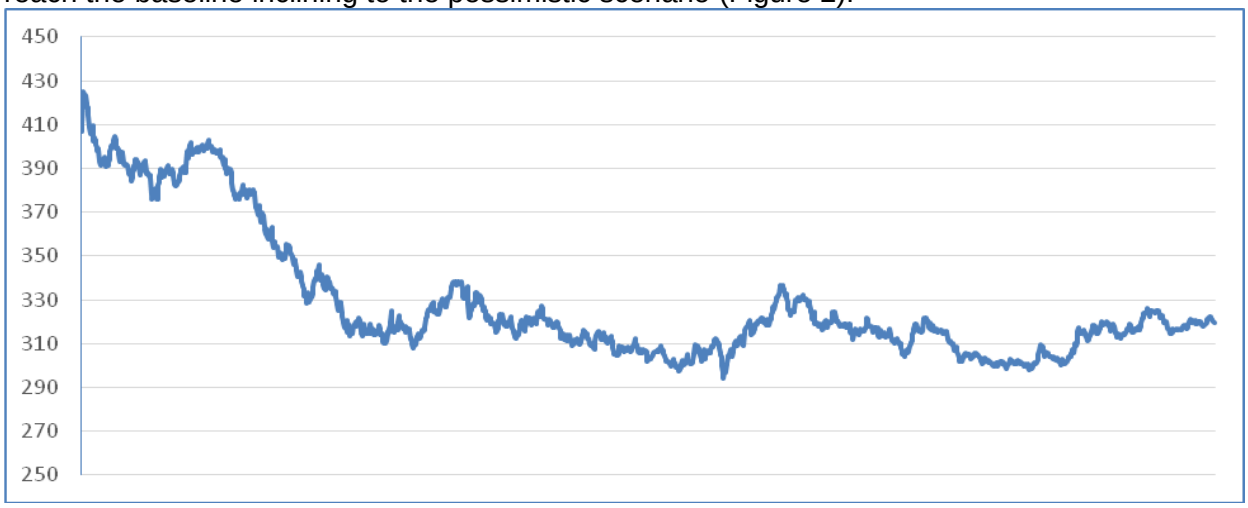

Figure 2
Rosneft Shares Performance January-October 2017

In view of this, scenario weights should be revised towards the pessimistic one as follows:

- baseline – 50 %;
- optimistic– 20 %;
- pessimistic – 30 %;

giving the following values of the Company and its shares:

CV = 5,924 · 0.5 + 7,140 · 0.2 + 4,839 · 0.3 = 5,847.7 bn roubles
SV = 343 · 0.5 + 457 · 0.2 + 240 · 0.3 = 334.9 roubles/share

Discussion

The branch of economic science treating appraisal of businesses has passed a long way in developed countries while Russia is relatively new to the market economy, which is why many advanced solutions in the field of appraisal cannot be used to their full extent here.

Such authors as A. Damodaran, T. Copeland, T. Koller, J. Murrin and others suggest tools for various market situations. Russian scientists (A.G. Griaznova, M.A. Fedotova and others) work to adapt the foreign achievements to Russian realities. The matters of discount rate and capital cost calculation were explored by F. Modigliani, M. Miller and S.C. Mayers[14], as well as by P. Brussov, T. Filatova[15] and N. Orekhova[16].

This study differs from the abovementioned ones suggesting a comprehensive set of tools to appraise businesses under high uncertainty and changing environment without using complicated mathematic models giving a substantial advantage of avoiding the use of enormous ranges of data. On one hand, such data have not yet been accumulated during the short market era of Russia. On the other hand, Russian companies are so dynamic and volatile, that their development cannot be forecasted by historic data. Therefore, the scenario approach based substantially on an expert opinion allows to forecast indicators by consideration of three versions instead of one.

Despite the high country risks and, therefore, high discount rates determined on accrual basis, Russian companies find ways to attract investments at lower rates thus keeping the weighted average cost of capital substantially below the market average. It is the weighted average cost that determines profitability acceptable to a Russian investor which makes the WACC method even more important.

Conclusion

Thus, the company was valued under three developmental scenarios. The results are substantiated by the following:

[14] S. C. Mayers and N. S. Majluf, “Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have”, Journal of Financial Economics num 13 (1984).
[15] T. V. Filatova; N. P. Orekhova and A. P. Brussova, “Weighted average cost of capital in the theory of Modigliani-Miller, modified for a finite lifetime company”, Vestnik FA num 4 (2008): 74-77.
[16] Pet. Brussov; T. Filatova; N. Orekhova and N. Brussova, “Weighted average cost of capital in the theory of Modigliani-Miller, modified for a finite lifetime company”, Applied Financial Economics num 21 (11) (2011): 815-824; Pet. Brussov; T. Filatova; N. Orekhova; M. Eskindarov; Pav. Brussov and N. Brussova, “Influence of debt financing on the effectiveness of the finite duration investment project”, Applied Financial Economics num 21 (11) (2011): 1043-1052; Pet. Brussov; T. Filatova; N. Orekhova; Pav. Brussov and N. Brussova, “From Modigliani-Miller to general theory of capital cost and capital structure of the company”, Research Journal of Economics, Bussiness and ICT Vol: 2 (2011): 16-21 y A. S. Nhleco and C. Musingwini, “Estimating Cost of Equity in Project Discount Rates Using the Capital Asset Pricing Model and Gordons Wealth Growth Model”, International Journal of Mining, Reclamation and Environment Vol: 30 num 5 (2016): 390-404.

- forecasting cash flow components out of 5-year historic data under three scenarios of the company development;
- using EBITDA instead of net income enabling to eliminate influence of investment and financial activities to concentrate on the operational one;
- amendment of the calculation of discount rate as a weighted average capital cost with valuation of equity using capital assets pricing model making it possible to do without a dividend forecast.

Recommendations

The study is useful, first of all, to potential investors in Russian companies – foreign as well as domestic ones – interested in evaluation of financial prospects of their investments.

On the other hand, it is useful to professional appraisers from the methodic viewpoint because it contains business evaluation instruments applicable to the unstable Russian economy.

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