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Biggest Public Oil Companies: Impact of External and Internal Factors on Capitalization

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ABSTRACT

Estimate and search for factors that influence the capitalization of public oil companies are of great interest to researchers. The impact of various external and internal factors on the value of oil companies' stocks was considered. This includes changes in oil prices, stock market index movements, inflation fluctuations, financial and production indicators. The study includes building models with calculated standard errors by the Driscoll-Kraay method based on quarterly data for the eight biggest public oil companies operating in the upstream and downstream segments, from the first quarter of 2006 to the third quarter of 2017. Such indicators as total oil production by OPEC countries, greenhouse gas emissions by companies, and the sum of shareholder's funds owned by large institutional investors were used for the first time when building the model to identify factors affecting the market capitalization of oil companies. One of the key results is the conclusion that quarterly production volumes turned out to be the most significant factor having a positive impact on the cost of oil firms. That is, investors are laying the idea of compensating for losses from lowering the cost of oil by increasing its production and selling a larger volume in the value of shares in companies. At the same time, such indicators of production efficiency as profitability in the upstream and downstream segments lose their significance depending on the period under consideration.

Keywords: capitalization; oil industry; mining and processing; stock market; external and internal factors

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INTRODUCTION

Oil companies as investment objects

Investment objects are of value to potential beneficiaries in case there are prospects for further increase in their value. To evaluate an asset and its earning power, it is necessary to conduct an integrated analysis of external and internal factors, their impact on the selected object, as well as to forecast future changes and events entailing these changes. Oil companies are not an exception, although there are specifics of the enterprises in this industry to be considered in the analysis. Among other things, an expert's choice of an assessment approach depends on this.

Before we move to the technical details of the study, determining the factors affecting the performance of oil companies, it is worth evaluating the investment attractiveness of this industry in the long term. Macroeconomic analysis of the oil industry and its prospects will answer how practical it is to buy shares of oil companies.

From 1965 to 2015, i.e. over a 50-year period, the rapid growth of the global economy led to an increase in oil demand by 2.8 times: from 1,524 to 4,332 million tons[1]. Important is the growth in

[1] Statistical review of world energy — all data. BP — 2017. URL: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html (accessed on 15.08.2018).

aggregate demand of the countries of the Asian region that increased by more than 9 times over the same time period (from 163 to 1506 million tons), while it increased by 2 times for North America (from 620 to 1042 million tons). This fact is due to the rapid development of the economies of the Asian region. This also confirms a significant increase in the share of oil consumption in the region, which increased from 10% of the global level in 1965 to 34.7% by 2015, and in 2017 amounted to 35.7%.

According to the predicted values of global oil demand presented in the reports of world analytical centers, the demand volume indicator will amount to 4916 million tons by 2040 (*Fig. 1*), 13% higher than in 2016.

It is important that, despite the differences in the predicted values of energy demand volumes presented in the analytical reports of various agencies and organizations, they agree that oil will continue to hold a leading position in terms of energy consumption for the coming decades. The analysis of the current and predicted indicators of oil consumption proves the demand for the oil industry development. This implies the further development of the oil business and the ability of oil companies to generate income for their shareholders.

To make the best investment decision, stock market participants are guided by methods for determining the fair value of public companies. Under such an analysis, one should consider as many factors as possible that can influence stock prices and play a role in the value formation and further development of the companies. Current issues of determining capitalization of oil companies are the most relevant due to the high price volatility in the oil market started in 2014.

Stock prices of some large oil companies and the value of futures contracts for the Brent crude oil from 2006 to 2017 (*Fig. 2*) demonstrate that the capitalization of firms follows the dynamics of energy prices, but the observed decline is not as significant as the oil price. From 2013 to 2015, the oil price fell by 60%, however, over the same time, the value of ExxonMobil, Chevron and Royal Dutch Shell shares fell by 23, 28 and 36%, respectively.

Considering the analysis, it can be assumed that large oil companies have a protective mechanism due to which the negative impact of declining oil prices is smoothed out. As a result, the capitalization losses reduce within unfavorable market conditions. By the end of 2017, the stock price of the Chevron oil company equaled the values of 2013 and compensated for the decline that started in 2013, while the oil price failed to recover to its previous maximum.

Diversification of production activities into upstream and downstream segments is a mechanism protecting oil companies' capitalization from decline. *Figures 3* and *4* illustrate a slump in operating profit for the upstream segment of the biggest oil companies Exxon Mobil, Chevron, BP and Total in 2014–2015, when oil prices fell significantly and the downstream segment grew over the same period. The presented graphs show that operating profit in the refining segment is not influenced by changes in the oil market, which supposedly was the reason for stock prices not to decrease proportionate to the oil price downturn.

The development of oil companies depends on the factors requiring a more detailed analysis. This will become the key to more effective forecast models of capitalization of oil companies. The following questions should be answered in this work: what factors determine the dynamics of stock prices? how do large oil companies manage to mitigate the effects of declining oil prices?

OVERVIEW OF EXISTING STUDIES

Evaluation and search for factors influencing the capitalization of oil companies is of great interest to researchers. Many studies are devoted to the impact of external factors on the capitalization of oil companies, including the impact of changes in oil stock prices [2–6], stock index movement [4], inflation fluctuations and industrial production index [7].

In some works, the behavior of stock prices of oil companies is considered not only based on external factors, but also internal factors, such as financial and production ones, that are included in econometric models [8–10].

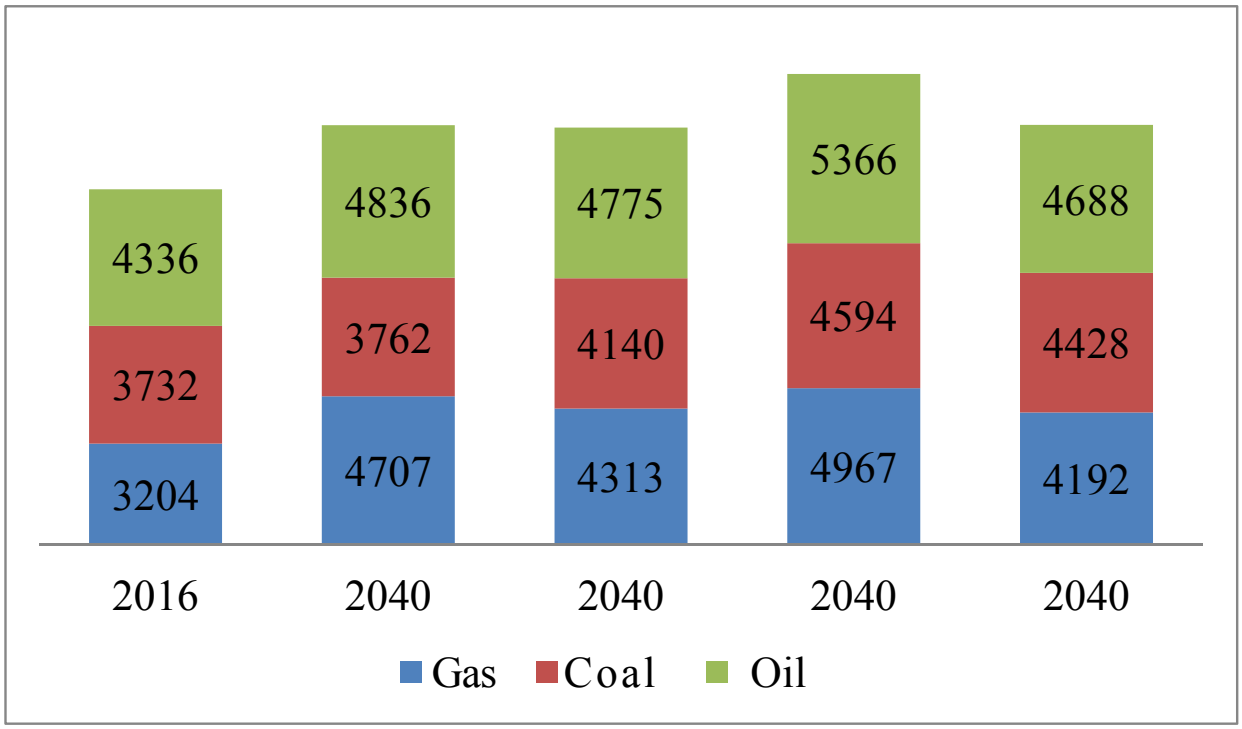

Fig. 1. **Predicted values of global demand for fossil fuels by 2040 according to baseline scenarios (million tons of oil equivalent)**

Source: compiled by the authors based on data from reports by BP, IEA, OPEC, INEI RAS [1].

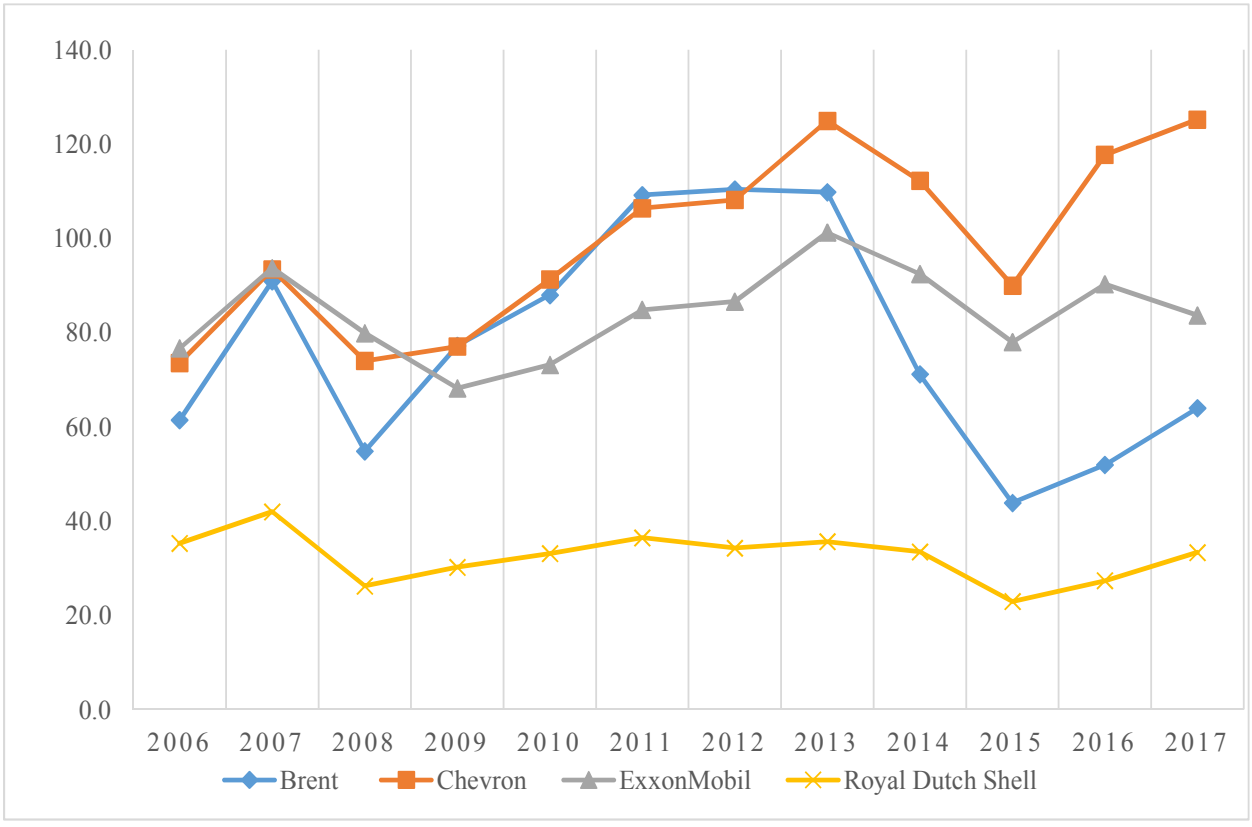

Fig. 2. **Share prices of some public oil companies and Brent crude oil from 2006 to 2017 (in US dollars)**

Source: compiled by the authors based on on data from the Thomson Reuters Eikon database.

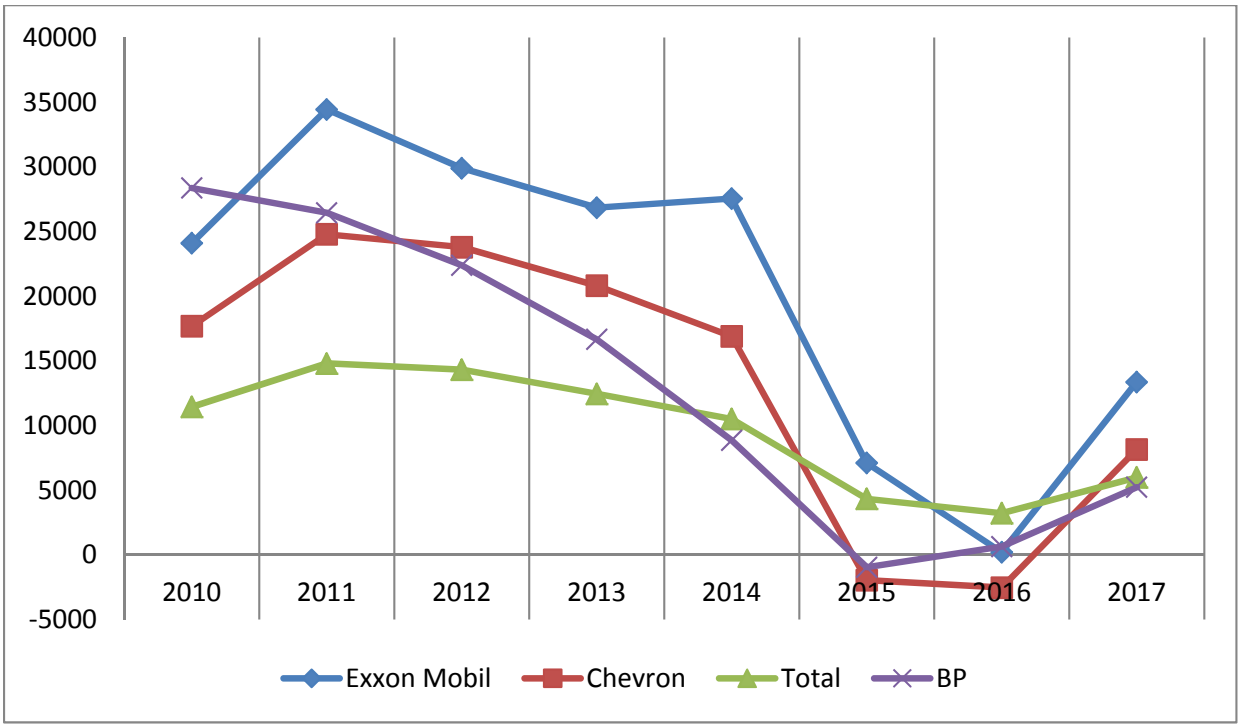

Fig. 3. **Operating profit of oil companies in the production segment from 2010 to 2017 (million US dollars)**

Source: compiled by the authors according to data from annual reports of companies.

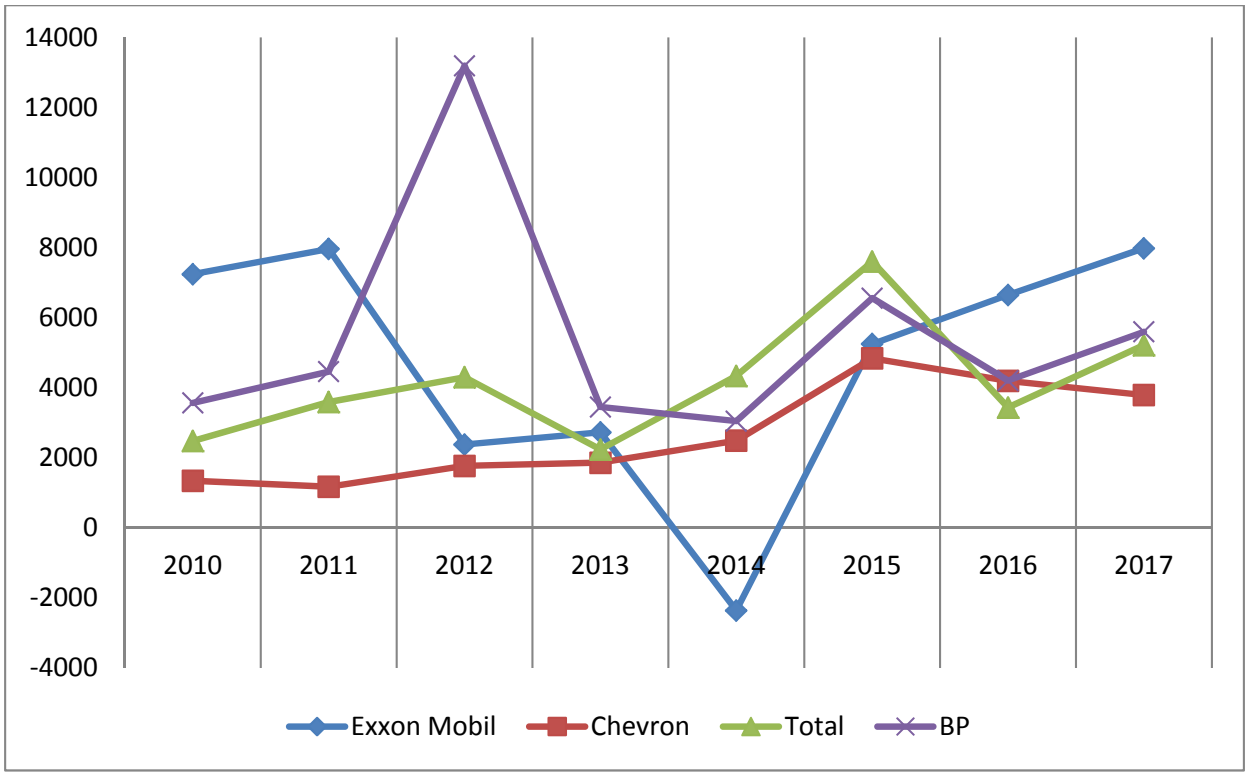

Fig. 4. **Operating profit of oil companies in the refining segment from 2010 to 2017 (million US dollars)**

Source: compiled by the authors according to data from annual reports of companies.

In [9], the authors use more than ten independent variables characterizing the general financial condition of oil companies; they include the ratio of capital costs to revenue, dividend payout ratio, fixed asset turnover ratio, reserve growth rate, etc. The empirical study provides a sample of annual data for the period 2009–2013 of 82 oil companies. The authors came to the following conclusions [9]:

- the higher the dividends, the higher is the stock prices of oil companies;
- the growth of profitability of companies stimulates the growth of the value of securities;
- the variable capital expenditures turned out to be insignificant.

The study presents a rather short time period using annual rather than quarterly data. From 2009 to 2013, oil prices were in a bull trend, as were the global stock markets, which had a significant impact on the growth in the price of oil companies.

In this study a broader period is considered: from 2006 to 2017. We will use quarterly data allowing to analyze the influence of factors included in the model on the stock prices of oil companies depending on the upward / downward trend of oil prices.

In [2], the authors suggest that in the future, oil companies will have to conduct their production activities according to global requirements to reduce environmental impact within the framework of the climate agenda against global warming. However, this hypothesis is not proved in the work in any way. In [2], the influence of factors on the company value is assessed individually distinguishing this work from many others. This approach showed extremely low values of the R^2 indicator (ENI was the highest indicator in the regression, with the value of 0.12) [2] which is not beneficial to the consistency of the results.

As part of study [10], the authors found that regardless of the industry where the resource company belongs to, revenue, fossil price and EBITDA are fundamental value drivers. Like in previous studies, macroeconomic factors are not presented in the work.

In [2], an individual approach to companies is used — 4 companies from different industries, including the energy sector. Such an approach does not give the whole picture of the industry, as the results can be explained by the leadership position and the range of activity of the companies under review (each company's capitalization exceeds 25 billion US dollars).

In [11], the authors also analyze the impact of financial and production indicators on the stock prices of oil companies. To conduct an empirical analysis, the authors collected annual panel data on 14 international companies in the oil and gas sector from 1990 to 2003. According to the results of the study, oil prices and oil production volumes had a significant impact on the value of oil companies.

As part of this study, the influence of both external and internal factors on the capitalization of oil companies will be analyzed. These will include the factors that were not previously explored in the works, such as profitability in production and processing, volumes of energy production by OPEC countries, and the total share of equity owned by the largest institutional investors (top-100 on the list of owners). The studies on the decisions of OPEC countries on production volumes are mainly devoted to identifying the relationship between the production volumes and the oil price; this factor was not used in any of the above works on changing the capitalization of oil companies.

In this study, we verify the following hypotheses:

H1: diversification of production activity by oil companies reduces the negative impact of declining prices in the oil market; in other words, rising profitability in the production and refining segment has a positive effect on the capitalization of oil companies;

H2: increasing debt ratio of companies leads to a decrease in the market value of oil companies;

H3: increasing equity profit leads to increasing capitalization of oil companies;

H4: increasing the Brent crude oil price has a positive effect on the market value of oil companies;

H5: increase in dividend payments per share has a positive effect on capitalization;

H6: geopolitical uncertainty and tension, greenhouse gas emissions, oil production by OPEC countries affect the market value of oil companies;

H7: increasing share of institutional investors and a company's oil production in the companies' equity have a positive effect on capitalization.

DATA

To conduct a regression analysis, we collected quarterly data of the eight biggest public oil companies operating in the upstream and downstream sectors based on market capitalization (BP, Chevron, Exxon Mobil, Royal Dutch Shell, Total, Equinor, OMV, Imperial Oil) for the period from the 1st quarter of 2006 to the 3rd quarter of 2017. The selected period is explained by the fact that the data for some factors included in the study had not yet appeared by the time the study was conducted.

To collect the data, the following electronic resources were used: the Thomson Reuters Eikon database, Yahoo! Finance, quarterly reports of the companies (they are presented on the websites of the companies, as well as in the SEC database called the EDGAR System) — to aggregate financial and production indicators for oil companies, and the information on the share of institutional investors; Investing.com — the data on the Brent crude oil price, Jodi Oil — the data on OPEC oil production. Other open Internet sources were also used to collect the data.

Table 1 shows the endogenous and exogenous variables that will be used to build models for regression analysis.

RESEARCH METHODOLOGY

As part of the analysis of the existing studies, the following model was developed for econometric analysis:

$$m_{it} = ß_0 + ß_1 external'_{it} + ß_2 KPI'_{it} + v_{it},$$

where $i = 1, 2,\ldots; n$; $t = 1, 2,\ldots T$; $v_{it} = u_i + e_{it}$;

m_{it} — is a dependent variable, which is market capitalization;

$external'_{it}$ — is a vector of variables having an external influence on oil companies which are not able to influence them (includes *OPECoilprod, GRI, WUI, BOWNERS, OILPrice*);

KPI'_{it} — is a vector of variable production and financial indicators of the company (includes *COP, GGEmissions, Debt_ratio, DivYield, ROE, Prof_up, Prof_down*);

u_{it} — is unobserved individual effects, and e_{it} — is residual perturbation [12, p. 5].

To reduce the emission performance in the sample, as well as to adjust all variables for their comparability, we used the logistic data standardization, carried out according to the following algorithm [13]:

$$Factor_{tr} = \frac{1}{1+\exp\left[-Slope\times\left(Factor - Median\right)\right]},$$

where $Factor_{tr}$ — is the transformed value of the factor affecting the capitalization of oil companies and the endogenous variable;

Slope — is a transformation coefficient for dependent and independent variables;

Median — is a median value.

The transformation coefficient Slope was calculated by the following formula [13]:

$$0.95 = \frac{1}{1+\exp\left[-Slope\times\left(Factor_{95\%} - Median\right)\right]},$$

where $Factor_{95\%}$ — is the value of the 95% percentile of the dependent and independent variables;

Slope — is a transformation coefficient for dependent and independent variables;

Median — is a median value.

To consider autocorrelation and heteroskedasticity, we will build a model with standard errors calculated by the Driscoll-Kraay method. The model with fixed effects with standard errors by the Driscoll-Kraay method is as follows [14]:

$$\tilde{z}_{it} = z_{it} - \bar{z}_{it} + \bar{\bar{z}},$$

Table 1

Dependent and independent variables for regression analysis

Name in the model	Units of measure	Brief description
Endogenous variable		
MarketCap	Million dollars	Capitalization of an oil company. For the companies with the capitalization in national currency, the currency was exchanged to dollars at the average rate for the corresponding quarter*
Exogenous variables		
OPECoilprod	Thousand tons	The indicator of total oil production by OPEC countries
GRI	Point	Geopolitical Risk Index. Developed by Dario Caldara and Matteo Iacoviello. Based on the occurrence of words related to geopolitical tensions in 11 leading international newspapers**
WUI	Point	World Uncertainty Index. Developed by H. Ahir, N. Bloom and D. Furceri. Based on the frequency counts of "uncertainty" and its variants in the quarterly Economist Intelligence Unit (EIU) country reports***
GGEmissions	Tons / Million dollars	The company's greenhouse gas emissions accounting for $ 1 million in revenue. The data provided by the companies for this indicator are annual. Therefore, as part of this work, we adhered to the principle that emissions are evenly distributed by quarters within each year
Bowners	Shares	The total share of equity owned by the biggest institutional investors (top-100 on the list). This indicator will help conclude how much the biggest stock market the investors are interested in acquiring stocks of a particular company, and identify trends
COP	Barrels	Quarterly oil production by the company
Debt_ratio	%	Company debt ratio. It is calculated as the ratio of borrowed funds to total assets
Prof_up	%	Profitability of sales in the upstream segment, which is calculated as the ratio of profit in the production segment to the revenue in the corresponding segment
Prof_down	%	Profitability on sales in the downstream segment, which is calculated as the ratio of profit in the processing segment to the revenue in the corresponding segment
DivYield	%	Dividend payout ratio. It is calculated by the following formula: dividends per share / market share price
ROE	%	Return on equity. It is equal to net profit to equity ratio
OilPrice	Dollars	Brent crude oil price

Source: compiled by the authors.

* We used data on exchange rates.URL: https://ru.investing.com/currencies (accessed on 28.08.2019).

** More details on the calculation are here: http://www.policyuncertainty.com/gpr.html (accessed on 28.08.2019).

*** More details on the calculation are here: http://www.policyuncertainty.com/wui_quarterly.html (accessed on 28.08.2019).

where $z_{it} \in \{y_{it}, x_{it}\}$,

$$\bar{z}_i = T_i^{-1} \sum_{t=t_{i1}}^{T_i} z_{it},$$

$$\bar{\bar{z}} = \left(\sum T_i\right)^{-1} \sum_i \sum_t z_{it}.$$

In this case, the function of the dependent variable is calculated by the pooled OLS (pooled ordinary least squares) model:

$$\tilde{y}_{it} = \tilde{x}_{it}^{'} + \tilde{\varepsilon}_{it},$$

where $i = 1,\ldots, N$; $t = 1,\ldots, T$, while y_{it} — is a scalar, $\boldsymbol{x}_{it}$ — is $(K + 1) \times 1$ vector of independent variables, θ — is $(K + 1) \times 1$ coefficient vector.

In other words, the data can be noted in the following general form:

$$\mathbf{y} = \left[y_{1t_{11}} \ldots y_{1T_1}\, y_{2t_{21}} \ldots y_{NT_N} \right]',$$

$$\mathbf{X} = \left[\mathbf{x}_{1t_{11}} \ldots \mathbf{x}_{1T_1}\, \mathbf{x}_{2t_{21}} \ldots \mathbf{x}_{NT_N} \right]'.$$

Estimated coefficients θ can be calculated as follows:

$$\hat{\theta} = \left(\mathbf{X}'\mathbf{X}\right)^{-1} \mathbf{X}'\mathbf{y}.$$

The Driscoll-Kraay errors for a linear model can be noted as follows:

$$\mathbf{h}_{it}\left(\hat{\theta}\right) = \mathbf{x}_{it}\hat{\varepsilon}_{it} = \mathbf{x}_{it}\left(y_{it} - \mathbf{x}_{it}^{'}\hat{\theta}\right).$$

A detailed description of standard errors calculated by the Driscoll-Kraay method for the pooled OLS model is given in work [14].

Driscoll and Kraay showed that a modified standard nonparametric estimation of the covariance matrix of time series can remain effective, despite spatial and temporal dependence of the data [14, 15].

DATA ANALYSIS AND MODEL BUILDING

A balanced sample was made according to the collected data. We compile descriptive statistics for the data under review (*Table 2*).

Based on the data presented in *Table 2*, we can conclude the following:

1) the sample contains big and medium-sized companies; the maximum value for MarketCap presented in the data is $ 505 billion, while the minimum is $ 7.3 billion;

2) Debt_ratio (debt ratio) is 0.56 on average over the sample. This means that on average slightly more than half of the companies' assets (56% of assets) are formed by borrowing. This amount of borrowed funds is explained by long-term investment projects typical for the oil industry;

3) the average value for the Prof_down factor is almost two times less than for the Prof_up indicator, the standard deviation for Prof_up is 0.23, while for Prof_down it is 0.034. This suggests that the profitability in the production sector has more volatility and a wider range of values than for the processing sector, which includes greater risks in conducting business exclusively in this segment. As expected, the average profitability in upstream is higher, therefore, the risk is justified by higher profits in the sector.

The transformations carried out within the data normalization reduced the asymmetry and kurtosis coefficients (*Table 3*), although they could not completely level them.

As part of an econometric study, the data obtained during the logistic normalization will be used. In order to identify the relationships between the variables, a correlation matrix was built (*Table 4*). Since the data distributions differ from the normal one, the Spearman's rank correlation criterion was used. Based on the data obtained, the conclusions are following:

1) there is a correlation with variables WUI, BOWNERS, COP, Debt_ratio, Prof_down, ROE *и* OILPrice significant at a 10% significance level between the dependent variables;

2) according to the Chaddock scale, there is a high positive relationship between the market capitalization of oil companies and the volume of quarterly oil production (correlation coefficient = 0.82 <0.9);

3) there is a high negative relationship between the market capitalization of oil com-

Table 2

Descriptive statistics of dependent and independent variables by companies involved in mining and processing

Variable	Obs	Mean	Std. Dev.	Min	Max
MarketCap	384	154 235.4	109 742	7333.205	505 713.2
OPECoilprod	384	359 103.3	19 157.56	330 504.5	401 850
GRI	384	86.09145	31.53744	42.58954	189.9569
WUI	384	140.9283	40.05575	86.76926	250.476
GGEmissions	384	103.58	77.14108	37.585	633.5
BOWNERS	384	.3120043	.1182262	.067782	.645275
COP	384	1.35e + 08	7.05e + 07	1.22e + 07	6.52e + 08
Debt_ratio	384	.5659287	.0682635	.4074319	.6647185
Prof_up	384	.3269277	.2394137	–.7810881	.6838232
Prof_down	384	.0180773	.0343744	–.3161234	.1550507
DivYield	384	.0115384	.010989	0	.0646358
ROE	384	.0334323	.0354467	–.181	.142
OILPrice	384	80.81451	25.38886	36.77	126.3233

Source: compiled by the authors.

panies and the debt ratio (correlation coefficient = – 0.73);

4) high relationships between independent variables are not observed, since the correlation coefficients for independent variables do not exceed 0.6. Therefore, it can be assumed that multicollinearity is absent.

The signs at the correlation coefficients presented in *Table 4* correspond to the economic logic and hypotheses stated earlier. It is interesting that the growth of oil production by OPEC countries, geopolitical tensions and global uncertainty, greenhouse gas emissions and the debt ratio of companies negatively affect the capitalization of oil companies; other factors have positive signs at the coefficients. Another thing is that the relationship between the dependent variable and the oil price is weak (correlation coefficient = 0.09). Moreover, the correlation coefficient is significant at a 10% level, which again doubts the opinion that the oil price plays one of the most important roles in shaping the value of oil companies.

To verify the presence of autocorrelation and heteroskedasticity, we will carry out the corresponding tests. The results are presented in *Table 5*.

The Pesaran test showed the intergroup correlation; the null hypothesis of its absence was not confirmed [16, 17]. Presented in *Table 5,* the Wooldridge test results indicate serial correlation [18]. The modified Wald test showed the intergroup heteroskedasticity in the model under review [19].

In this work, we use a panel data model with fixed effects with errors calculated by the Driscoll-Kraay method. *Table 6* presents the simulation results. Within the study, we built (1) a general model, (2) a model that includes only external factors, (3) a model that includes only internal factors, as well as models using data before 2014 and after 2014 (4) and (5).

RESULTS

As can be seen from *Table 6*, the coefficient of the variable OPECoilprod has a positive sign in mod-

Table 3

Indicators of asymmetry and excess kurtosis of dependent and independent variables before and after logistic transformation

№	Variable	Before normalization		After normalization	
		Skew	Kurt	Skew	Kurt
1	MarketCap	.96	3.51	.36	2.12
2	OPECoilprod	.22	2.01	–.059	1.36
3	GRI	1.30	4.42	.55	2.22
4	WUI	.79	3.13	.22	1.63
5	GGEmissions	3.91	24.76	.8	2.67
6	BOWNERS	–.078	2.27	.002	1.42
7	COP	.87	9.8	–.008	1.51
8	Debt_ratio	–.67	2.51	–.053	1.42
9	Prof_up	–1.44	5.84	–.009	1.3
10	Prof_down	–2.74	29.27	–.079	2.35
11	DivYield	1.78	7.3	.43	2.50
12	ROE	–.81	7.1	.024	1.78
13	OILPrice	.12	1.6	.057	1.37

Source: compiled by the authors.

els (1), (2) and (4). In other words, an increase in oil production by OPEC countries leads to an increase in the capitalization of oil companies in the production and refining segments. It is important that the sign at the coefficient differs in models (4) and (5). It can be assumed that until 2014, the supply of energy resources grew according to the global economy development as a whole, which had a positive effect on the value of oil companies. However, after 2014, the supply of oil exceeded the current level of consumption, the sign at the variable OPECoilprod changed to the opposite.

The GRI and WUI variables turned out to be significant in the general model, while the coefficient at the geopolitical tension index has a positive sign in models (1), (2), (4) and (5). At the same time, the world uncertainty index is negative, although in model (5) the sign has reversed. The results can be interpreted as follows: geopolitical tensions in the world, including terrorist attacks, wars, sanctions, have a positive effect on the capitalization growth of oil companies, also because oil exporting countries were at the centre of operations. The world uncertainty index is more concerned with the economic component; therefore, the lack of an accurate global economic policy negatively affects the value of companies.

The GGEmissions variable has a positive sign at the coefficient in all models. In model (5), the factor turned out to be insignificant at any reasonable level of significance. These results indicate that while companies have not faced serious restrictions on emissions from the states, therefore, the increase in greenhouse gas emissions associated with an increase in production positively affects the capitalization of companies.

The sign at BOWNERS is positive in models (1), (2) and (4), i.e. an increase in the total share of equity owned by the 100 biggest institutional

Table 4

Correlation matrix (Spearman's correlation coefficients)

	MarketCap	OPECoilprod	GRI	WUI	GGEmissions	BOWNERS	COP	Debt_ratio	Prof_up	Prof_down	DivYield	ROE
MarketCap	1.0000											
OPECoilprod	−0.0015	1.0000										
GRI	−0.0063	0.3980*	1.0000									
WUI	−0.0920*	0.5270*	0.3413*	1.0000								
GGEmissions	−0.3499*	0.0014	0.2201*	0.0406	1.0000							
BOWNERS	0.3940*	0.1222*	0.1302*	0.1388*	−0.2584*	1.0000						
COP	0.8196*	−0.0197	0.0035	−0.0527	−0.3207*	0.4507*	1.0000					
Debt_ratio	−0.7389*	−0.0492	−0.0301	−0.0783	0.1631*	−0.4347*	−0.5230*	1.0000				
Prof_up	0.0329	−0.3145*	−0.4474*	−0.4543*	0.0495	−0.2465*	−0.0531	0.0532	1.0000			
Prof_down	0.0846*	0.1462*	0.2964*	0.2386*	0.2096*	0.1708*	0.1722*	−0.0801	−0.2675*	1.0000		
DivYield	0.0048	0.1095*	0.0840	0.1925*	−0.2357*	−0.0209	0.1018*	−0.0242	−0.3410*	−0.0405	1.0000	
ROE	0.3508*	−0.2681*	−0.3258*	−0.5209*	−0.2211*	−0.0241	0.2619*	−0.1215*	0.5535*	−0.0116	−0.3209*	1.0000
OILPrice	0.0986*	−0.0825	−0.4869*	−0.1566*	−0.4095*	−0.1380*	−0.0551	−0.0442	0.5329*	−0.3644*	−0.1673*	0.4545*

* — dependence ⩽ 0,1

Source: compiled by the authors.

Table 5

Test results on the presence of serial correlation and heteroskedasticity

Pesaran test		Pesaran test		Wald test (modified)	
CD	Pr	F	Prob>F	chi2	Prob>chi2
4.7	0.0000	18.87	0.0034	463.34	0.0000

Source: compiled by the authors.

Table 6

Results of building regression models considering the Discroll-Kraay standard errors

	1	2	3	4****	5****
OPECoilprod	.031*	.032		.51**	−.036*
GRI	.084***	.073***		.86***	.056
WUI	−.05*	−.11**		−.001	.059*
GGEmissions	.08***		.042*	.025***	.022
BOWNERS	.056*	.05*		.11**	−.062*
COP	.066*		.059*	.089**	.16***
Debt_ratio	.023		−.003	.038	−.022
Prof_up	.038*		.039*	.046*	−.023*
Prof_down	−.022*		−.023*	−.002	−.061***
DivYield	−.019*		−.024*	.001	−.104***
ROE	.051**		.059*	.069**	.017
OILPrice	.06***	.07***		.051**	.147**
_cons	.317***	.457***	.453***	.130*	.460***
N	384	384	384	288	96
R 2	0.28	0.19	0.18	0.33	0.44
Prob>F	0.0002	0.0019	0.0013	0.0000	0.0000

Source: compiled by the authors.

* — significant at 15% level; ** — significant at 5% level;

*** — significant at 1% level; **** — models 4 and 5 are constructed according to the data until 2014 and after 2014, respectively.

investors had a positive effect on the company's capitalization. In model (5), the sign at the factor turned out to be negative.

The Debt_ratio factor turned out to be insignificant in each of the constructed models. The coefficient on sales profitability in the upstream segment has a positive sign in all models, except model (5), while the profitability of sales in the downstream segment is negative. Both factors were significant. Within the framework of the general model, the results can be interpreted as follows: at a high oil price, it is more profitable to sell crude oil, rather than refine it. As for the negative signs at the coefficients in model (5), it can be assumed that the investors were skeptical about the shares of oil companies after 2014 and paid attention to the absolute indicators of revenue and profit, which were decreasing.

It is important that the coefficient for the DivYield variable turned out to be negative in all considered models, except model (4), where the factor turned out to be insignificant, i.e. the investors did not pay attention to the dividend payout ratio until 2014. According to the results obtained, after 2014, the investors became negative to the attempts of the companies to keep them at the expense of dividend income growth. The same conclusion is true for the general model.

The coefficients for the variables ROE and OilPrice turned out to be positive in each model. In other words, an increase in the coefficient of return on equity and the oil price lead to an increase in the capitalization of oil companies.

CONCLUSIONS

The econometric study revealed the influence of all factors included in the model on the capitalization of oil companies, except the debt ratio. The following results were received as a result of the hypotheses testing.

Diversification of production activity by oil companies reduces the negative impact of declining oil prices. The upstream segment profitability has a positive impact on the change in the capitalization of energy companies. However, in the case of the long-term decline in oil prices observed after 2014, this factor was not ultimate in the investors' decisions. The sign at the coefficient turned out to be negative, which does not have an economic and logical interpretation, except that the investors are not much oriented towards the internal financial performance of oil companies in the event of external shocks in the oil market that to some extent may be due to irrational behavior.

The debt ratio of oil companies was insignificant in none of the models, which can be explained by the significant debt burden on each of the companies included in the sample due to the specifics of their production activity; this reduces the attractiveness of this indicator for an investment decision. In other words, the investors do not pay attention to the debt ratio, as they are sure that the biggest oil companies will cope with their obligations.

Return on equity ratio has been significant. It has a positive effect on the value of shares of oil companies. In the model with data after 2014, it stopped being significant that proves the assumption about the irrationality of the investors outlined earlier.

The increase in the Brent crude oil price has a positive effect on the market value of oil companies. In the case of building a model according to data after 2014, the price of oil remained one of the few factors leading to an increase in the capitalization of oil companies.

An unexpected result was the sign at the dividend payout ratio, which turned out to be negative. In other words, investors have a negative attitude towards increasing dividend payments, which may be explained by the desire of investors to acquire shares in companies that have growth prospects. An increase in the dividend payout ratio indicates that the best option for free cash is to distribute it among shareholders, rather than investing in promising projects. Besides, the growth of this indicator against the significant debt burden can also be perceived negatively.

The indices of geopolitical tension and uncertainty, greenhouse gas emissions, the level of oil production by OPEC countries were significant in the built models. The coefficient for the greenhouse gas emission factor turned out to be

positive, i.e. investors have not yet set negative expectations regarding changes in the capitalization of oil companies in the context of their environmental impact.

According to the study results, it was found that an increase in the share of institutional investors and the volume of oil production by the company in its equity have a positive effect on the shares of oil companies in the framework of the general model. Supposedly, institutional investors influence the market by their decisions; their increasing share in oil companies leads to an increase in capitalization. Such a mechanism is successfully implemented with a bull trend in the market, including the energy market, whereas with a bear trend it stopped working (the sign changed to negative with the BOWNERS factor). Despite the increase in the share of oil companies by the 100 biggest players, the institutional investors who buy shares, their market influence is not so great as to deploy shares during general decline.

The results obtained help conclude that quarterly production volumes are the most significant factor that has a positive impact on the value of oil companies. Investors may lay the idea of compensating for losses by lowering the oil price by increasing its production and selling a larger amount of oil in the price of shares of companies.

It is important to note the following: the oil price has a greater impact on the value of oil companies during the decline than during the growth period [the coefficient for the OILPrice variable is almost the highest in model (5), and it is about 3 times higher than the value for the same variable in model (4)]. This conclusion is opposite to the results of study [4] showing the opposite asymmetric effect of changes in oil prices and the value of stocks of companies: price increase had a greater impact than decrease. The result obtained in [4] can be explained by the prevailing bull trend both in the stock market and in the energy market in the period under review. The authors used the data on stock prices of 30 oil companies and oil prices from January 2, 2004 to December 31, 2015.

The same is true for the opposite result obtained for dividend payout ratios. In [9], the authors conclude that it has a positive effect on the value of stock prices of oil companies. They considered the annual data for 82 oil companies from 2009 to 2013, when the market had a pronounced uptrend after the 2008 crisis.

To continue the study on the valuation of companies, including those of the oil industry, it is useful to analyze the influence of the considered factors not only on the capitalization of oil companies operating both in upstream and downstream segments, but also the ones engaged in production in only one of them. This will allow specialize and clarify the findings from the segmentation of companies.

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