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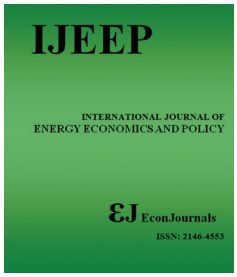

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Statistical Analysis of the Relationship between Oil Prices and Industry Index Prices

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ABSTRACT

The article is devoted to the study of the relationship between the level of industry indices and the oil market. It is proved that there are positive and negative effects associated with an increase in sales and oil prices and world indices. It is very difficult to establish a clear relationship between the level of industry indices and the development of the oil market, but statistical methods help to identify existing relationships. The purpose of the article is to identify the relationship between oil price and industry index prices through statistical analysis. The objectives of the work are: to consider existing approaches to assessing the relationship between oil price and prices of industry indices through the review of literature, to consider theoretical aspects of the relationship between oil prices for indices of stock exchanges, to form a model of statistical analysis and to check it on specific data of the Moscow Stock Exchange. Statistical analysis of the relationship between oil prices and industry index prices has helped international organizations to develop preventive measures to support positive market effects and to boost global markets.

Keywords: Correlation-regression Analysis, Industry Indices, Oil Price, Pair Regression Model, Mean Approximation Error, Interval Prediction
JEL Classifications: C50, G10, G15

1. INTRODUCTION

In a market economy, economic ability acts as a competitive ability. In other words, competitiveness is a specific form of economic ability of a producer in a competitive market. As an economic category, it reflects the relevant specific historical conditions of economic relations between producers of products to ensure its economic viability, that is, to ensure cost-effective production, the ability to bring appropriate market standards profit.

At the current stage of the development of market economic relations, one of the important directions of investment is the investment of financial resources in the instruments of the stock market. One of the investment process' stages in the field of financial investment is the study of the relationship between oil price and prices of industry indices.

Global changes are becoming a significant challenge for modern society. The increase in the number and power of extreme economic phenomena, the growth of man-made disasters provoke the main threats to sustainable development, which are embodied in the energy crisis, which is associated with changes in the balance of supply and energy resources' demand due to advances in the development of oil and gas production technologies. In turn, such crises lead to significant changes in industry indices. These crises reinforce each other.

At the same time, it is difficult to draw unambiguous conclusions about the positive or negative relationship between the level of industry indices and oil production. The main factors of influence are the efficiency of individual industries; processing technologies that are used; the level of the country's development of the country, which determines the cost of labor; and even the system of state regulation, which affects the level of state support for individual sectors of the economy.

Analysts of international organizations dealing with the relationship between oil market development and industry development also determine that direct and indirect influence is very important to determine and it is necessary to take into account the limited importance of oil, compared to solid fuel, in the global energy supply for the successful operation of many industries. For example, this new source of demand for agricultural raw materials creates opportunities, but also risks in the food, production and oil refining sectors, which causes the relationship between industry indices and oil prices.

Thus, there is a certain relationship between oil prices and industry indices, justified by the experience of observing world markets. But integrated policies are needed to minimize their consequences. All of this requires the creation of new methods for integrated modelling that will allow research into the cumulative effects of different sources of risk in industry and fuel markets. Therefore, the focus is on research into the relationship between energy and industry indices. The increasing capacity of model statistical research in this area has led to the relevance of this work.

In our opinion, the classical theory of financial investment pays sufficient attention to the problems of assessing the state of stock markets and investment analysis of individual industries using appropriate stock indices. However, the analysis of the interlinkages between industry indices and the prediction of the interlinkages of market developments within the framework of the general theory of financial markets is not sufficiently disclosed.

This study is one of the few attempts to conduct a comprehensive analysis of the depth of penetration of Russia's industry market into global processes and to determine the factors affecting its dynamics by means of world stock indices and oil prices. Examples of earlier similar studies on the Russian stock market are very few (Almosov et al., 2019; Orlova, 2018; Rusakovich 2018; Shkarina, 2019) and do not contain statistical analysis and models of the relationship between industry indices and oil prices.

The objective necessity of the present study is the application of methods of economic-mathematical modeling. In particular, for the purposes of this study, the traditional statistical method - correlation-regression analysis - was quite naturally chosen, which, in our opinion, is quite simple and shows fully adequate results.

Thus, the purpose of this study is to confirm or refute the hypothesis that there are relationships between the national industry market and the oil market in the statistical analysis of the relevant stock exchange and industry indices.

The main objectives of this publication are the disclosure of the economic content of the fundamental analysis of stock relations between industry indices and oil prices, the structure of these relations, the definition of the procedure for carrying out macroeconomic analysis and modeling, the analysis of the impact of the main macroeconomic factors on the development of the domestic industry market, the level of its relationship with international oil markets and the development of recommendations for the calculation of macroeconomic indicators on the basis of statistical modeling.

2. REVIEW OF LITERATURE

Questions of statistical analysis of the market indices are the subject of research in the scientific works of both domestic (Almosov et al., 2019; Bobkov and Skorina, 2019; Orlov, 2018; Rusakovich and Malyutina, 2018; Shkarina, 2019; Mikhailov 2018) and foreign experts (Bass, 2017; Marashdeh and Afandi, 2017; Randjbaran, et al., 2018; Waheed, 2018; Ferrera et al., 2019). Some researchers, such as (Orlov, 2018; Bass, 2017), determine that in the near future a significant factor of influence on the oil market development (and then the industry market) should be the formation of a special trade regime for fuel within the WTO. The key issues of a possible trade regime, according to "Orlov 2018," should become:

1. Classification of fuel products as agricultural, industrial or environmental products to determine tariffs for it;
2. The role of subsidies in increasing the production of individual industries and the consistency of various domestic measures and standards (Orlov 2018:74).

However, the international community has only been discussing these issues so far. The decisions taken, according to "Bass 2017", will have an impact on the level of world economic security of many countries of the world (Bass, 2017:226). In addition, it is necessary to emphasize the need to increase the efficiency of industries in order to increase the impact of positive factors on the level of economic security, not excluding the oil market.

According to Ouakhid, when considering the interplay between oil prices and industry indices, it is necessary to assess not only superficial trends, but also to try to take into account deep economic relations (Waheed, 2018:767). At the same time, it should be noted that price increases are not only a challenge (primarily for consumers), but also an opportunity for producers.

In addition, according to "Bobkov and Skorina, 2019," strengthening the link between industry production and energy demand can lead to higher prices of products, volumes of production and GDP (Bobkov and Skorina, 2019:147). The development of oil production can stimulate access to energy in both rural and industrial areas, contributing to further economic growth and long-term improvement of economic security. "Almosov et al., 2019," as well as "Ranjaban 2018:9" also agree with such conclusions.

Many researchers noted the relationship between exchange indices and prices. Thus, "Mikhaylov, 2018" stresses that the domestic stock indices had a strong level of correlation (0.8-0.95) with the dynamics of the movement of international stock indices on fuel in 2008-2018. However, the level of correlation in 2010 changed significantly. Thus, the level of relationship between the movement of international and domestic securities markets from oil prices has decreased to the average, and with some markets (Japan) and to the weak one (0.27-0.35) (Mikhaylov, 2018:68).

"Marashdeh and Afandi 2017" in his work considers the movement of stock indices, which can be explained by the influence on their dynamics of various factors. Thus, stock indices have different composition of index baskets (Marashdeh and Afandi, 2017:316) (for example, in Russia shares of oil and gas companies play a significant role). As can be seen from the researcher's conclusions, during a certain period oil prices decreased (negative impact on the Russian stock index), and prices for products of the mining and metallurgical complex in the world increased (this positively affected the domestic stock index). "Almosov et al., 2019" in his study observed a significant level of correlation between the dynamics of industry indices, oil prices and the rate of the EUR/USD (Almosov et al., 2019:220) exchange rate. The researcher revealed the presence of a negative correlation, but a weak force. Another researcher –"Marashdeh and Afandi 2017" considered the relationship of these indicators, States that in this situation it is necessary to clearly identify the factors that affect the direction of movement of the industry market, and on the basis of regression analysis to determine the strength of the influence of each of them (Marashdeh and Afandi, 2017:318). The calculation of the correlation of these indicators should be carried out on a regular basis, since the value of the correlation coefficient has been unstable in recent years.

Researcher "Shkarina, 2019" in her work paid attention to the forecasting of industry indices taking into account various factors, including oil prices. In her opinion, in order to more effectively and comprehensively forecast the state of the economy, it is necessary to calculate a composite index of industry indicators (Shkarina, 2019:107).

These questions referred to P. Ferrer, according to which account should be taken of the dynamics of prices for industrial products that have a significant impact on the domestic economy (for example, prices for steel and oil, as in the structure of domestic export share iron and steel industry and oil exports are quite significant) (Ferreira et al., 2019:89). This is true, as it will also allow investment managers to expand the tools of statistical analysis and modeling of the industry market.

Some researchers (Bobkov and Shkarina, 2019, Rusakovich and Malyutina, 2018) note that investment analysts cannot carry out a comprehensive statistical analysis of the domestic industry market at the macro and micro levels. One of the main factors, according To "Rusakovich and Malyutina, 2018", inhibiting the development of this type of analysis, is the inadequacy of the information field within the industry market of Russia. We can agree with this, since at the present stage the functioning of the domestic industry market corresponds to the concepts of information asymmetry and deterministic chaos.

So, the study of available sources on the topic of work leads to the following conclusions:

- There is certainly a relationship between the level of industry production and the development of the oil market. The rise in oil and petroleum production has led to higher prices for agricultural raw materials, as well as industrial production. The development of the oil market and the increase in the prices of industry products at the same time contribute to the growth and competitiveness of agriculture. However, it is not clear that this link is significant.
- Further research is needed on the statistical dependence of industry markets and oil prices, taking into account more factors, in order to identify not only the directions of impact, but also the development of preventive measures to increase the positive effects of the strengthening of the oil market.

World experience shows that industry markets can be sources of large-scale financial instability, macroeconomic risks and social shocks. Thus, as a derivative of the real sector, the industry market can have a significant reverse effect of both stabilizing and destabilizing nature.

Integration processes taking place in the world economy create modern realities in which the study of the national industry market is inexpedient to conduct separately from the set of leading factors, focusing only on one or two. Therefore, only in the conditions of taking into account the influence exercised by the external environment, namely, the world economic processes, it becomes possible to effectively predict the development of the national economy of the country and its industries.

When conducting fundamental analysis at the macro level, a number of macroeconomic indicators are calculated in international practice, which characterize the economic situation in the country and affect the dynamics of the currency and industry market.

The statistical analysis of interrelation of various branch indexes and prices of oil market in Russia in the conditions of formation of market relations has a number of features (weak information security, etc.), demanding detailed research and definition of character of their influence on efficiency of the subsequent financial investment.

In order to increase the efficiency of statistical analysis, it is necessary to use regression analysis of the factors' influence causing asynchronous market movements in the study of the impact of oil prices on the dynamics of domestic industry indices.

To calculate the impact of macroeconomic factors on the state of the industry market, it is advisable to:

- Calculate business activity indices (in industry, services, agriculture);
- Develop and regularly calculate a consolidated index of leading industry indicators on the basis of methods used in international financial practice, using additional components whose impact on the domestic economy is significant (in particular, oil prices);

One possible way of taking into account the above-mentioned influence may be to analyze the dependence of the industry market on world markets - in particular, the oil market. The establishment of linkages between sectoral markets makes it possible to rely on forecasts of the development of the state economy based on the situation in the oil market.

As it is known, stock indices are integrated indicators of the state of organized (exchange) industry markets, that is why the assessment of their interrelations with oil prices will allow to establish the degree of influence of individual world resource markets on the industry market of Russia in order to improve the efficiency of forecasting the development of the state economy.

In turn, when considering organized industry markets, it is necessary to take into account their relationship with some key resource markets, since the rates of securities of industry complexes are also influenced by General trends in the exchange markets of precious metals, oil and other raw materials. Therefore, when analyzing key trends in industry markets, it is advisable to look not only at stock indices, but also at other stock indices, which are indicators of the state of key commodity markets.

The assessment of the level of interrelation between the industry markets of Russia and the world markets of energy resources will allow to define further more reasonable and exact forecasts of development of the state economy in General and the industry market of Russia in particular. This, in turn, will allow potential investors to more accurately analyze and predict global and national stock market conditions, identify markets and industry leaders, providing an opportunity to adequately compare the effectiveness of investment in different markets.

Thus, scientific and practical studies devoted to the analysis of the interdependence of organized industry markets and the relevant stock indices of energy resources (oil, in particular) are relevant and timely.

Before moving directly to statistical analysis, we emphasize that there are different techniques for averaging and calculating the values of industry indices, the consideration of which goes beyond the limits of this work. That is, in the future we will analyze real statistics on the values of different indices, without taking into account the different nature of obtaining these values. Theoretical questions on different approaches in the calculation of values of industry indices are covered, for example, in the work of "Rusakovich and Malyutina 2018."

For the study, the statistics of Russian stock exchanges, data provided by Bloomberg and Reuters information terminals, monographic studies, various reference publications, materials of foreign and Russian periodicals devoted to the stock market and stock indices were processed. The data sources for Russian stock indices were the databases of the Moscow stock exchange (Moscow Stock Exchange 2019).

The relationship study defines the use of integrated models that combine different contours of market system regulation. Therefore, it is necessary to consider the task of building a model that would allow for chaotic regimes in the space of socio-economic variables of the sectoral indicators and oil prices. Based on research into the industry economy, the following assumptions will be used:

1. The global economy creates some demand for the various productive sectoral systems that are responsible for the sustainable development of society. Some of the resources produced by these systems are spent on maintaining their internal structure, the other on external functions, which are determined by the global economy's demand for energy resources. These issues depend on various factors: current state of production systems, load, environmental actions, efficiency of regulatory mechanisms.
2. There are regulatory factors that, in the case of excess demand, lead to growth in industry systems. The number of such factors cannot grow indefinitely, as there are certain economic and material constraints that inhibit this growth, so that part of them are constantly involved in this process.

3. MATERIALS AND METHODS

In order to conduct a study of the dependence of the industry indices of Russia and the world's leading stock indices and oil prices, 9 groups of industry indices of the Moscow Stock Exchange were determined:

1. IMOEX; (12 enterprises in the industry);
2. TRANS; (4 enterprises in the industry);
3. XIM; (5 enterprises in the industry);
4. POTREB; (11 enterprises in the industry);
5. FIN; (8 enterprises in the industry);
6. METALDOB; (12 enterprises in the industry);
7. TELKOM; (5 enterprises in the industry);
8. ELEKT; (19 enterprises in the industry);
9. NEFTGAZ. (12 businesses in the industry).

4. RESULTS

In it the predictor is the price of oil - OIL, the regressors are the prices of Industry indices: IMOEX; TRANS; XIM; POTREB; FIN; METALDOB; TELKOM; ELEKT; NEFTGAZ.

To increase the representativeness of the sample, the calculations used only the values of the instruments on the days on which trading occurred exclusively for all instruments. Also, the calculations took into account the geographical parameters associated with the time lag of the opening/closing of trading platforms.

To compare the historical volatility of industry indices, the standard deviation of the cost of instruments for a given period of time was calculated, which allowed to determine the measure of risk of using a financial instrument for a given period of time. To represent the results of calculating the standard deviation of the values of the studied instruments for the specified periods, the absolute values of the standard deviation are presented as a percentage of the average value of the instrument for the period.

It should also be noted that the dependence of Russian industry indices on world oil prices is much higher than in the world as a whole. Therefore, the Russian industry market is characterized by a much higher degree of integration into global economic processes, in particular, in the oil trade.

According to the initial data for December 2007-September 2019 at the beginning of the month, we will build a matrix of paired

correlation coefficients using the "Correlation" tool in Excel (Orlova, 2018:124) and present the result in Table 1.

The highest direct relationship is observed between the price of oil and the price of THE Telkom industry index (r=0.648), and there is no relationship with the price of the TRANS industry index (r<0.1). There is a high dependence between some prices of industry indices (r>0.7), therefore, the presence of co linearity of factors is assumed.

We check for multicollinearity between the remaining factors using Farrar-Glober statistic.

The calculated value of the Farrar–Glober statistic was (Babeshko et al., 208:385):

$$FG_{obser} = -\left[n - 1 - \frac{1}{6}(2k+5)\right]\ln\left(\det\left[R_1\right]\right) = 1138,940 \quad (1)$$

where n = 81 is the number of observations (correlation coefficients);
k = 9 - number of factors (industry indices);
- The determinant of the matrix of cross-factor correlations.

The actual value of this FGobserv criterion was compared to the table value c^2 for degrees of freedom and significance α = 0.05 by determining it with the function CHI20OBR.

Since Fgnable > Fgcrit (1138,940 > 50,998), therefore, there is multicollinearity among the independent variables.

Multicollinearity leads to unreliable estimates of regression coefficients, accordingly, it is necessary to get rid of insignificant variables in the model. The method of step-by-step selection of factors, the meaning of which consists in successive removal of the least significant variables according to the Student's criterion, obtained the following model of multiple regression:

$$OIL = 25,297 - 0,003*XIM + 0,043*TELKOM \quad (2)$$

The two-factor model is statistically significant according to Fisher's criterion, as well as its parameters according to Student's criterion, 64.3% of the variation in oil price is due to the variation in industry indices XIM and TELKOM: the increase in the price of the industry index XIM by 1 unit, all other things being equal, leads to a decrease in the price of oil by 0.003 units on average, and the increase in the price of the industry index TELKOM - to an increase in the price of oil by 0.043 units on average.

The matrix of paired correlation coefficients (Table 1) showed a moderate and noticeable relationship between the price of oil and the prices of industry indices XIM, METALDOB, TELKOM, ELEKT and NEFTGAZ. Paired regression models have been built, where the independent variable is the price of oil and the dependent are selected industry indices. Compare models by quality criteria:

1. The significance of the Student's regression coefficients;
2. The significance of the equation as a whole by Fisher's criterion;
3. The value of the determination factor;
4. Value of average approximation error by formula (Minashkin, 2018:448):

$$\bar{A} = \frac{1}{n} * \sum \left| \frac{(y - \hat{y})}{y} \right| * 100\% \quad (3)$$

The result is shown in Table 2. It is worth noting that the initial data for the possibility of building nonlinear regression models using the function "Add trend line" in Excel was surveyed, as a result of which none of the suitable nonlinear functions were revealed.

For each of the obtained paired models of prices of industry indices versus the price of oil the Significance of F is < 0.01, hence the models are statistically significant in the overall Fisher's criterion with 99% probability.

P-The regression coefficient value b for each model is also < 0.01, hence the model coefficients are statistically significant by the Student criterion with 99% probability.

Table 1: Matrix of paired correlation coefficients

	OIL	IMOEX	TRANS	XIM	POTREB	FIN	METALDOB	TELKOM	ELEKT	NEFTGAZ
OIL	1									
IMOEX	−0,250	1								
TRANS	0,072	0,421	1							
XIM	−0,453	0,896	0,244	1						
POTREB	−0,188	0,670	0,017	0,746	1					
FIN	−0,216	0,796	0,585	0,738	0,698	1				
METALDOB	−0,310	0,889	0,529	0,748	0,518	0,823	1			
TELKOM	0,648	0,261	0,203	0,029	0,438	0,406	0,210	1		
ELEKT	0,323	0,143	0,672	−0,161	−0,189	0,400	0,428	0,458	1	
NEFTGAZ	−0,394	0,943	0,180	0,924	0,687	0,640	0,777	0,068	−0,142	1

Table 2: Pairwise models of dependence of prices of industry indices on oil price

Industry indexes	a	b	R^2	Importance F	P-value	$\bar{A}$
XIM	15077,681	−74,291	0,206	0,000	0,000	58,2
METALDOB	5468,361	−17,453	0,096	0,000	0,000	37,5
TELKOM	1081,741	9,863	0,420	0,000	0,000	15,3
ELEKT	1074,637	9,060	0,104	0,000	0,000	37,5
NEFTGAZ	5898,495	−24,502	0,155	0,000	0,000	34,4

The average approximation error shows how many theoretical values on average deviate from empirical values, hence the smaller the approximation error, the more accurate the model is.

The determination factor shows the proportion of variation in the price of industry indices depending on the variation in the price of oil, hence the higher it is, the better the equation obtained.

The determination factor shows the proportion of variation in the price of industry indices depending on the variation in the price of oil, hence the higher it is, the better the equation obtained.

Thus, the best pair model of regression can be called the linear model of dependence of the price of the industry index TELKOM on the price of oil (5). The economic point of the regression coefficient is that if the price of oil increases by 1 unit, the price of the industry index TELKOM grows by an average of 9.863 units. The elasticity factor calculated by formula (4) (Kremer, 2018:354) shows that if the price of oil increases by 1%, the price of the industry index TELKOM grows by 0.42% on average:

$$\bar{э} = \frac{b \times \bar{x}}{a + b \times \bar{x}} = \frac{9,863 \times 80,842}{1081,741 + 9,863 \times 80,842} = 0,42 \qquad (4)$$

We predict the price of oil by the end of 2019 using the most approximating function (Figure 1).

On the basis of the oil price forecast, we will build the TELKOM industry index price forecast by substituting the found forecast values into the obtained regression equation:

$$TELKOM = 1081,741 + 9,863 * OIL \qquad (5)$$

The resulting regression equation estimates (5) allow it to be used to produce a forecast. The maximum forecast error is calculated using the formula (Eliseeva, 2016:565):

$$\Delta_{y_p} = \pm t_{kpnt} \times \sqrt{\frac{\sum (y - \hat{y}_x)^2}{n-2}} \times \sqrt{1 + \frac{1}{n} + \frac{(x_p - \bar{x})^2}{n \times \sigma_x^2}} \qquad (6)$$

The prediction result is shown in Table 3.

Thus, with a probability of 95%, it can be argued that the price of the industry index TELKOM in December 2019 will be from 981.56 to 2188.91 units.

Also it is important to study the dependence of prices on industry indices on each other. The matrix of the pair correlation coefficients (Table 1) shows that the strongest bond ($r > 0.7$) is observed between the following pairs of variables:

- IMOEX and XIM
- IMOEX and FIN
- IMOEX and METALDOB
- IMOEX and NEFTGAZ
- XIM and POTREB
- XIMK and FIN
- XIM and METALDOB
- XIM and NEFTGAZ
- FIN and METALDOB
- METALDOB and NEFTGAZ.

It should also be noted that the association of industry indices between each other always has a positive direction, except for the weak negative relationship between the price of the industry index ELEKT and the prices of the industry indices XIM, POTREB and NEFTGAZ. That is, prices on industry indices influence each other in such a way that the price increase of one industry index leads to the price increase of another industry index, and how significant this growth is to be assessed.

As a result of the construction of the pair regression models of the above variable pairs, Table 4 was obtained.

The models of the relationship between XIM and POTREB, FIN, METALDOB and NEFTGAZ are inadequate in terms of approximation error because it has a value of over 15%. Also in two of these models, parameter a is not statistically significant with 95% probability.

The equation of the price relationship model on the industry indices METALDOB and NEFTGAZ is also not adequate to the real data because the value of the average approximation error is over 15%.

Figure 1: Polynomial model of oil price dynamics for 12.2007-09.2019

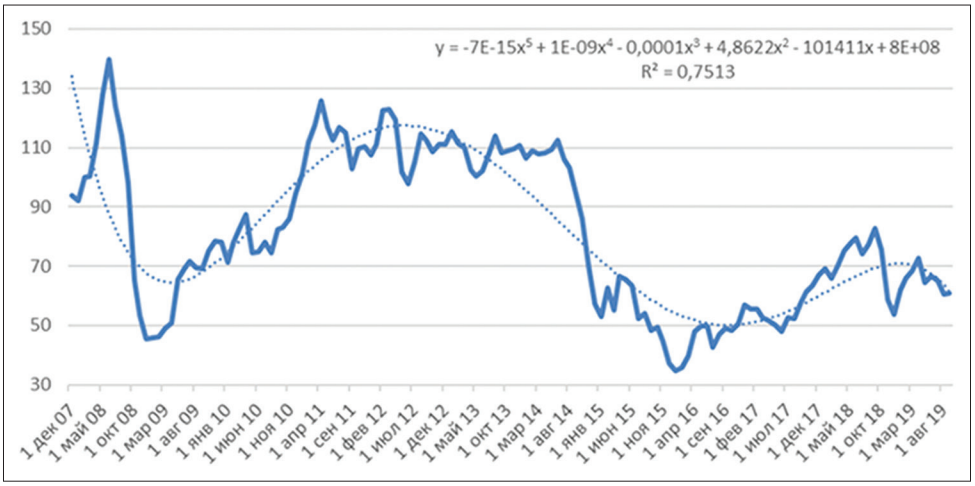

Table 3: TELKOM industry index price forecast at end 2019

Date	Oil price point forecast	Lower bound of the forecast	Point price forecast for the industry index TELKOM	Upper bound of the forecast
01.10.2019	58,50	1056,21	1658,68	2261,14
01.11.2019	55,05	1021,65	1624,63	2227,62
01.12.2019	51,05	981,56	1585,24	2188,91

Table 4: The results of the evaluation of the dependence of prices on industry indices from each other

Relationship	a	b	R^2	Importance F	P-parameter value a	P-parameter value b	Ā
IMOEX и XIM	812,402	0,096	0,802	0,000	0,000	0,000	10,6
IMOEX и FIN	244,048	0,258	0,633	0,000	0,011	0,000	10,5
IMOEX и METALDOB	560,662	0,276	0,790	0,000	0,000	0,000	11,6
IMOEX и NEFTGAZ	639,988	0,265	0,889	0,000	0,000	0,000	8,3
XIM и POTREB	−1711,249	2,099	0,556	0,000	0,046	0,000	30,7
XIM и FIN	−3409,418	2,246	0,545	0,000	0,001	0,000	31,3
XIM и METALDOB	245,747	2,175	0,560	0,000	0,727	0,000	35,6
XIM и NEFTGAZ	−473,566	2,436	0,854	0,000	0,192	0,000	35,6
FIN и METALDOB	2365,543	0,787	0,678	0,000	0,000	0,000	13,1
METALDOB и NEFTGAZ	1294,530	0,705	0,604	0,000	0,000	0,000	23,4

The Analysis of the remaining obtained models shows that all these models of price relationship on industry indices with each other are statistically significant and adequate real data, model parameters are statistically significant and reliable, respectively, models are suitable for forecasting.

Economic interpretation of qualitative regression models:

- An increase in prices on the industry XIM index for 1 unit leads to an increase in prices for the industry IMOEX index for 0.096 units.
- An increase in prices on the industry FIN index for 1 unit leads to an increase in prices for the industry IMOEX index for 0.258 units.
- An increase in prices on the industry METALDOB index for 1 unit leads to an increase in prices for the industry IMOEX index for 0.276 units.
- An increase in prices on the industry NEFTGAS index for 1 unit leads to an increase in prices for the industry IMOEX index for 0.265 units.
- An increase in prices on the industry METALDOB index for 1 unit leads to increase in prices for the industry FIN index for 0.787 units.

Each of these models has a high quality, since the determination factor (R-square) is greater than 0.6.

Thus, the correlation-regression analysis allowed to obtain statistically significant and suitable for forecasting regression model of dependence of prices for industry indices on the price of oil, as well as prices for industry indices from each other. On the basis of the best model, the price forecast for THE Telkom industry index until the end of 2019, depending on the oil price, was made.

The method of step-by-step selection of factors in order to eliminate multicollinearity it was also obtained a two-factor model reflecting dependence of oil price on prices of industry indices XIM and TELKOM.

The main conclusion of the study is the assessment of the availability and degree of dependence of prices for industry indices on oil prices for 2007-2019.

Summing up the obtained results of correlation-regression analysis of dependence of Russian industry indices on oil prices, It can be said that although some of Russia's professional stock market participants claim a fairly deep penetration of the Russian industry market into the global financial environment, the analysis showed that the limits of the Russian market have not yet been erased, which means that the Russian industry market lives according to its own specific laws, that sometimes have little to do with the economic postulates of free competition. Among the main negative factors impeding its development are the low level of information transparency of the market, the insufficient liquidity of available financial instruments and the high risk of the vast majority of financial transactions. This state of the economic environment does not allow to fully implement the classical world approaches of investment assessment to Russian reality.

To check whether the dynamics of the Russian stock market corresponds to global trends, just the correlation-regression analysis of stock indices allows. According to the results of statistical analysis of dependence of industry markets and oil prices in 2007-2019, it gave mixed results, so it makes sense to regularly monitor the relationship between industry indices of Russia and the leading world resource markets, prices for gold, silver and oil.

5. CONCLUSIONS AND RECOMMENDATIONS

So, the existing models predict parameters for the development of the industry market price changes of crude oil and petroleum products not currently have a global nature and do not reflect the situation in the industry and oil market. Therefore, it is important to determine the conditions and limitations of the

development of industry markets depending on oil trade and to form recommendations for their application in the strategy of energy supply and economic security of Russia, taking into account possible economic and geopolitical threats.

The development of most sectors of the country is due to the unbalanced distribution of oil production and consumption. World oil trade is a complex system that affects the development of all sectors of the economy. This relationship can be described by methods of statistical analysis – in particular by the method of correlation and regression analysis. This method is used to describe the structure of complex systems, and in the case of the interdependence of industry markets and world oil trade, it identifies the relationship between industry indices and energy prices.

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