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The Analysis of Sanctions' Influence
on Russian Stock Market Based
on Sanction Index Development

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Anti-Russian sanctions have become one of the key factors, determining the state of the Russian national economics in recent years. Financial restrictions against companies and residents, which constrict the possibility of raising foreign funding and limit cooperation with abroad investors, have become one of the sanctions' types. Such events could not but affect the state of the Russian financial market. The aim of the work under discussion is to estimate the impact of anti-Russian sanctions on the Russian financial market from 2014 till 2018. In order to achieve the stated objective the authors developed a system of indexes that allow quantitatively showing the sanctions imposed against Russia by different foreign countries. The indexes were calculated not only for all restrictions in total, but also for sanctions imposed by different groups of countries (USA, European Union and other countries). In addition, the developed indexes make it possible to take into account the degree of particular sanctions' impact based on the level of the object under sanctions. The stated indexes' analysis in relation to the variation of MOEX index allowed establishing the high degree of dependence of the Russian financial market's dynamics on the imposed sanction restrictions and justifying the proposed approach to indexes' calculation.

Keywords: Russian financial market, sanctions, anti-Russian sanctions, sanctions' influence, sanctions' influence index.

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Introduction and Theoretical Framework

Sanctions, used mainly as a tool for exercising political influence, nevertheless, have a significant impact on all aspects of the functioning of a country that is subject to established restrictions. Despite the fact that the achievement of the planned effect of the introduction of sanctions is discussed and disputed in the economic literature, the consequences of sanctions are tangible and require the implementation of decisions that correct various directions of public policy (Pape, 1997). The Russian-Ukrainian conflict and the annexation of Crimea to Russia served as the starting point for a long period of imposing sanctions on Russia and taking retaliatory measures. At the moment, almost any event that has occurred on the international political arena can be the reason for starting the next stage in the development of sanction measures. Anti-Russian sanctions imposed from the beginning of 2014 to June 2018 had serious economic consequences for our country, including the Russian financial market.

The financial market turned out to be particularly affected by the events that occurred due to the fact that many stages of the imposition of sanctions against individuals and legal entities implied restricting access to foreign sources of financing, which forced companies to seek new ways to attract investment and led to significant structural changes. The relevance of the study lies in the need to develop methodological tools to take into account the impact of anti-Russian sanctions on the dynamics of the Russian financial market.

The issues of the impact of the imposed sanctions on various sectors of the economics in recent years have received wide coverage in economic and legal literature in connection with the growing geopolitical tension in the world and the phased introduction of a set of restrictive measures by leading countries in relation to each other. Nevertheless, some studies on this subject have been carried out by Russian and foreign scientists before. The variety of possible forms of restrictions introduced, as well as their multidimensional impact on various aspects of state activity, stimulated the development of a large number of studies on this issue in various directions. Table 1 shows some of the existing works on the issue of sanctions and their consequences, including works related to the analysis of the impact of sanctions on the Russian financial market.

The relationship of the influence of economic sanctions of some states in relation to others is studied in detail in the economic literature. Sanctions as a tool of economic and political interaction are studied generally from the point of view of their expediency and effectiveness (Hufbauer, Oegg, 2003; Smeets, 2018), social consequences (Lv, Xu, 2017; Shahabi et al., 2015) The Russian-Ukrainian conflict provoked the emergence of a large number of new studies examining the problem of imposing sanctions from various points of view. Among the key areas are the analysis of the general impact of sanctions on the economy of Russia and other countries, the assessment of the role of Russia in the international political arena after the imposition of sanctions, the analysis of the impact of sanctions on certain segments of the economy (in particular, the financial market).

Currently, studies related to assessing the impact of sanctions through the construction of various sanction indexes are actively developing. These indexes are built on the basis of various approaches and methodologies, and their main goal is to quantify the impact of the imposed sanctions on various aspects of the economics of individual countries. The study by Dreger C. et al, who, on the basis of the developed sanctions index, explained the dynamics of the Russian rubble against the dollar and the euro, oil prices and a number of other macroeconomic indicators can be an example of such a work (Dreger et al., 2016).

The aim of this work was to analyse the impact of anti-Russian sanctions on the changes in the Russian financial market on the basis of the developed authors' indexes. It was the financial market that was chosen as the object of study, since this segment is the most sensitive to all the changes that are taking place, including the information covered in print and electronic publications. The analysis was carried out on the basis of constructing a system of indexes that take into account the nature of the sanctions introduced, as well as using a text analysis methodology that allows considering the impact of news texts on financial market fluctuations.

Methods and Empirical Study Base

Initially, the authors constructed a system of cumulative sanction indexes characterizing the gradual increase in the impact of the restrictions introduced on various aspects of the national economics of Russia. These cumulative indexes were built on the basis of the methodology proposed by the authors Dreger C. et al, and allowed evaluating the feasibility of their construction and the possibility of practical use. In general, the authors analyse the impact of economic sanctions imposed

Table 1. Directions of domestic and foreign studies on the issue of the consequences of sanctions

Direction of research	Authors	Study Content
		General Studies
Research on social issues related to the imposition of sanctions	(Lv, Xu, 2017)	Based on the use of the panel data method, the authors analyse the impact of economic sanctions on the increase of ethnic violence in the territories for which sanctions are imposed, and come to the conclusion that the relationship under consideration exists. In addition, the authors revealed the presence of a U-shaped relationship between income and ethnic violence
	(Shahabi et al., 2015)	The article discusses the impact of economic sanctions imposed on Iran on the health care system. In particular, the authors conclude that there is an indirect effect of sanctions on the effectiveness of cancer treatment, which is the third leading cause of death in Iran. The results of the study show a decrease in investments in the health care system, a decrease in the quality of purchased materials for the production of medicines, a decrease in the degree of affordability of drugs and an increase in their cost after the introduction of sanctions in 2012. The authors talk about the need to consider the human rights factor when deciding on sanctions against a state
Research of the effectiveness of economic sanctions	(Smeet, 2018)	The paper presents a comparison of the theoretical foundations of imposing sanctions and the expected result with the actual implementation of the procedure and the result obtained. The practical part is analysed on the example of sanctions imposed on Iran and Russia. The author comes to the conclusion that in practice sanctions do not always lead to the expected result and can have serious consequences both for the country they target and for the initiating country
	(Hufbauer, Oegg, 2003)	The article is an extract from a fundamental study of the authors on the issue of assessing the effectiveness of sanctions as a tool of influence in international politics. In particular, in the framework of this study, the authors investigate cases of US involvement in situations related to the imposition of sanctions, their impact on bilateral international trade, direct investment and capital flows
		Studies related to sanctions against Russia
Analysis of the general impact of sanctions against Russia on its economics and the economics of other countries	(Dong, Li, 2018)	The authors apply the game theory methodology to analyse the impact of the imposed sanctions on the United States, the European Union and Russia, concluding that all of these parties suffer losses from the restrictions imposed; however, the Russian Federation and its economics suffer to a greater extent
	(Ershov, 2016)	Examining the change of various macroeconomic indicators under the impact of sanctions, such as export and import volumes, net foreign reserves, domestic assets, net loans to banks, the Central Bank's key rate, the rubble against the dollar and the euro, the real refinancing rate, GDP, the money supply base, internal and external debt and a number of others, the author makes assumptions about the economic course that Russia must adhere to maintain stable growth and development in the context of new economic calls
	(Oja, 2015)	The author examines the influence of Russian counter-sanctions, introduced as a response to Western sanctions, on the Baltic countries. Due to the high share of exports to Russia, Lithuania, Latvia and Estonia are highly sensitive to problems in the Russian economy. The study showed that the total combined effect of sanctions and counter-

	Reference	Description
		sanctions on the economy of the Baltic countries was insignificant; however, the internal distribution that affects various sectors of the economy is important. In addition, among all the Baltic countries, Lithuania was most affected due to the highest share of exports to Russia
	(Tuzova, Qayum, 2016)	Based on the use of the vector autoregressive model, the authors assess the impact of changes in oil prices and the imposition of Western sanctions on real GDP, real effective interest rate, inflation, consumer spending and other macroeconomic indicators. The constructed model allowed the authors to make a forecast regarding the prospects of the Russian economy for the period 2015–2017, provided that sanctions are maintained. The article is especially interesting to read in order to compare the forecast with the real economic situation
	(Artem'ev, 2016)	The impact of sanctions on the financial sector (through the analysis of the dynamics of oil prices, exchange rates, a decrease in budget revenues, a decrease in gold and foreign exchange reserves, the export of capital from the country) and on foreign economic activity (through the analysis of a decrease in foreign trade turnover, changes in its structure, the analysis of activity of foreign economic activity) in different markets export / import structure) is considered
	(Bychkova, 2015)	This is the study of the impact of economic and financial sanctions on the phase of the economic cycle that characterizes Russia at the present stage. The analysis of the complex of macroeconomic indicators allowed the author to identify both positive and negative effects from the introduction of restrictions, while the current phase of the economic cycle was characterized as depressive
	(Simonov, 2015)	The author argues that the current trend of introducing international economic sanctions is a logical continuation of the competition that was caused by the structural world crisis of 2008. The article considers the situation in the Russian foreign exchange market that has developed as a result of anti-Russian sanctions and counter-sanctions and its impact on the development of import substitution
	(Fedorova, Nemchaninova, Fedorov, 2018)	The study focuses on the impact of sanctions on the performance of enterprises in various industries. The application of the analysis of DEA data and the Malmquist index made it possible to test the hypothesis that sanctions affect the productivity of enterprises working with foreign direct investment in specific industries for which sanctions were imposed. The empirical analysis also made it possible to say that the hypothesis about the greater influence of sanctions from countries with a high level of development on the activities of companies with FDI is not rejected on the Russian market
Assessment of Russia's participation and role in international cooperation after the imposition of sanctions	(Aalto, Forsberg, 2016)	The authors consider the economic and geopolitical interests of Russia and the methods of their promotion in the context of the imposition of sanctions, limitations and opportunities that our country has. Ultimately, the authors come to the conclusion that despite the current situation, Russia continues to be a significant participant in the international arena, the interests of which other market participants have to reckon with
Research of the impact of sanctions in the context of text analysis	(Pchegatluk, Zanina, 2018)	The article determines the proportion of informational messages on the topic of "sanctions" in the sample of publications under consideration, the most frequently used categories of words in articles of the Russian media, the frequency of their use in foreign articles, and other similar aspects of text analysis. As a result, the authors revealed a neutral character of reflection of the situation connected with the imposition of sanctions in the Russian media, while publications in foreign newspapers and magazines are mostly negative

Direction of research	Authors	Study Content
	(Koviazina, Il'iushchenia, Khabibullina, 2018)	This is a study based on methods of corpus linguistics, which defines lexical means for expressing a negative assessment of the foreign policy of the Russian Federation in foreign media
	(Hoffmann, Neuenkirch, 2017)	They analyse the impact of the conflict between Russia and Ukraine on the exchange profits of the Russian and Ukrainian stock markets. The authors have developed a new indicator of the escalation (de-escalation) of the conflict, based on the degree of tension of the text of the news related to this topic. Moreover, the frequency of mentioning sanctions in the news is one of the variables. The authors conclude that the intensification of the conflict reduces the profits earned on the Russian and Ukrainian stock exchanges
Analysis of the impact of sanctions on the Russian stock market	(Ankudinov, Ibragimov, Lebedev, 2017)	The paper examines the various characteristics of Russian stock indexes before and after the imposition of sanctions. The results demonstrate a high degree of volatility of all industry indexes after the imposition of sanctions. According to the authors, the constructed logarithmic regression model and the subsequent application of the "heavy tails" estimation method are of high practical importance in the financial analysis of stock indexes, although the study did not provide a convincing justification for structural gaps that arise between industries
	(Rafieisakhaei et al., 2016)	The paper explores the American and Russian financial markets in the period before and after the Ukrainian crisis. The author proceeds from the assumption that the impact of sanctions and the crisis seriously affected the fragile Russian financial market, upsetting the balance. For the purposes of analysis, the authors use the methodology for constructing the GARCH model, which allows evaluating the volatility and degree of asymmetry. The methodology for constructing ACD (Autoregressive Duration model), ACV (Autoregressive Conditional Volume) models is also used to evaluate various characteristics of the financial market and their interconnections. As a result, the authors revealed a significant increase in the number of transactions performed on the Moscow Exchange after the imposition of sanctions. At the same time, the duration of the operations themselves is reduced, but their volume increases

Source: compiled by the authors.

on Russia after the conflict in Ukraine, as well as the impact of the changes in oil prices on fluctuations in the exchange rate of the Russian rubble. The assessment of macroeconomic indicators and the imposed sanctions, combined with the use of text search and analysis tools in relation to media reports, allowed the authors to justify the fluctuations of the Russian currency, relating it to the imposition of sanctions and changes in raw material prices (Dreger et al., 2016).

Following the methodology for constructing the cumulative index of Dreger C. et al., we divided the entire set of sanctions into three categories depending on the degree of significance. The significance of sanctions was determined by the following characteristics of the objects against which they were introduced: individuals, legal entities, industries. The author's contribution consists in the development of a methodology for constructing a cumulative index through the study of the country effect, which was taken into account by constructing cumulative sanction indexes for the United States, the European Union, and other countries in aggregate.

The authors collected complete information about all cases of the imposition of sanctions against Russia for the period from March 17, 2014 to July 31, 2018. The fact of imposing restrictions was indicated by dummy variable 1. Sanctions against citizens, organizations and industries were assigned weight depending on their significance (1, 2 and 3, respectively). If sanctions of various categories were introduced on the same day, based on the assumption that their total effect was enhanced, the weights of these sanctions were also added up when constructing the index.

It should be noted that when constructing the indexes, the dates of extension of sanctions were not taken into account. Reports on the extension of sanctions certainly have an impact on the financial market, however, when the index was formed, these events could not be evaluated as new restrictions against one of the categories of entities.

The lack of application of the indexes in question is hidden in the methodology of their construction. The indexes are cumulative in nature, and, consequently, their values are constantly growing, responding to new sanction restrictions imposed on Russia. The use of these indexes in order to analyse the impact of sanctions on the financial market is limited, since it can lead to distorted results due to the constantly upward dynamics of their values.

In connection with the identified shortcoming, based on the application of the text analysis methodology the authors constructed two new indexes characterizing the intensity of coverage of sanctions imposed against Russia in foreign media. The authors

proceeded from the assumption that the dynamics of the financial market indicators directly depends on the number of references to Russia and the restrictions connected with it in the foreign media.

The SAN0 and SAN1 indexes were built on the basis of the methodology of the advanced thematic modelling algorithm, which supposes time-optimized searches and matrix operations with an array of news data and relevant sentiment. The SAN0 index included the number of media references to the words "sanctions" and "economic sanctions"; the expanded SAN1 index was calculated based on the words "sanctions", "economic sanctions", "restriction", "ban", "blockade", "block", "barrier", "import ban".

To build indexes, the Thomson Reuters database was used, which served as a source of news texts. For the purposes of analysis, the authors considered news for the period from 2013 to 2018 (test period of 2015–2018). The total sample of news texts amounted to more than 10 million news from various sources accredited by Thomson Reuters, the main ones of which are the New York Post, CNN, Breitbart, Reuters, Fox, Atlantic, The Washington Post, and Buzzfeed.

The daily dynamics of the constructed indexes was analysed in conjunction with the changes in the Moscow Exchange index (MICEX index, MOEX index) and the US dollar against the Russian rubble (RATE), which were selected as indicators of changes in the Russian financial market. As a result, the most significant indicators were identified that determine the dynamics of key indicators of the Russian financial market.

Results of Analysis

The dynamics of the constructed cumulative sanction indexes (general, USA, EU and other countries) are presented in Fig. 1.

The overall cumulative sanctions index is constantly growing due to the constant introduction of new sanctions against Russia, but the pace of its change moves over time. Rapid growth was observed in 2014, since it was the first year of the international confrontation (from March 2014 to March 2015) that was marked by a large number of restrictions imposed almost daily on our country. In March 2015, the graph of the general cumulative index became flatter. One can also note a pronounced rise from June to December 2016, associated with the systematic sequential expansion of sanction lists by various countries.

Comparing the indexes formed for the USA and the countries of the European Union, it can be seen that in the period until the fall of 2016, the sanctions imposed by the European
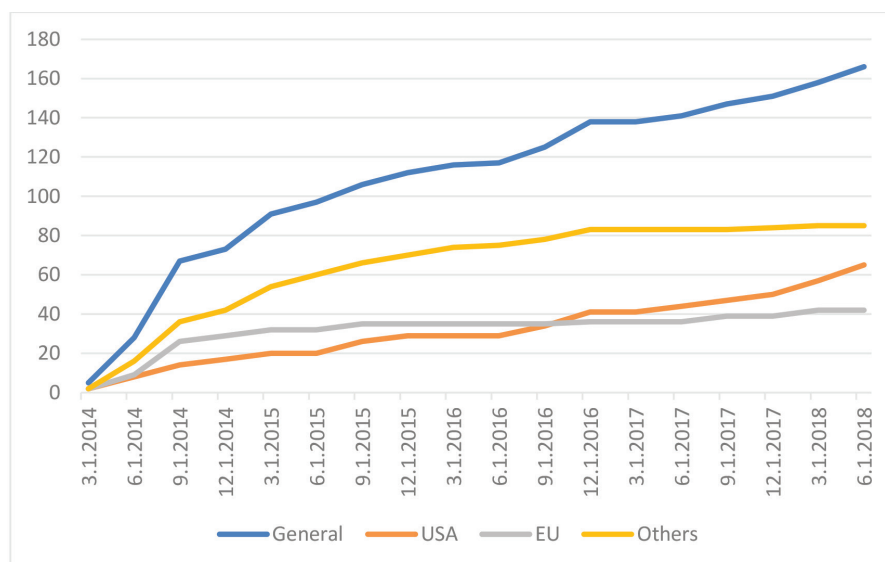
Fig. 1. Sanctions cumulative index in dynamics

Union had a greater influence (greater total weight). However, subsequently, the curve reflecting the sanctions activity of the EU countries has practically no ups, while the cumulative index of US sanctions began to grow rapidly. Such a trend can be explained by the political events that took place in the USA during the period under review, namely, the election situation, the election of a new president and his subsequent confrontation with a number of senior officials and political figures. The curve reflecting the influence of all other countries that were not included in the first two categories, in our opinion, is not representative enough, since the generalization of a large number of countries into a single category leads to a significant increase in the cumulative index solely due to an increase in the number of dates associated with the imposition of sanctions. Thus, this index takes on a higher value only because of the scale of its coverage.

The indexes built for the USA, EU countries and other countries do not give a total result obtained when constructing the overall cumulative index. This is due to the fact that often the same date is marked by the imposition of sanctions by several states simultaneously. In such situations, it can be difficult to single out the influence of restrictions imposed by a particular country, especially if they are identical in content. That is why the same dates and assessments of the impact of sanctions fall into the calculation of several indexes simultaneously.

The dynamics of the constructed SAN0 and SAN1 indexes has an upward trend too (Fig. 2).
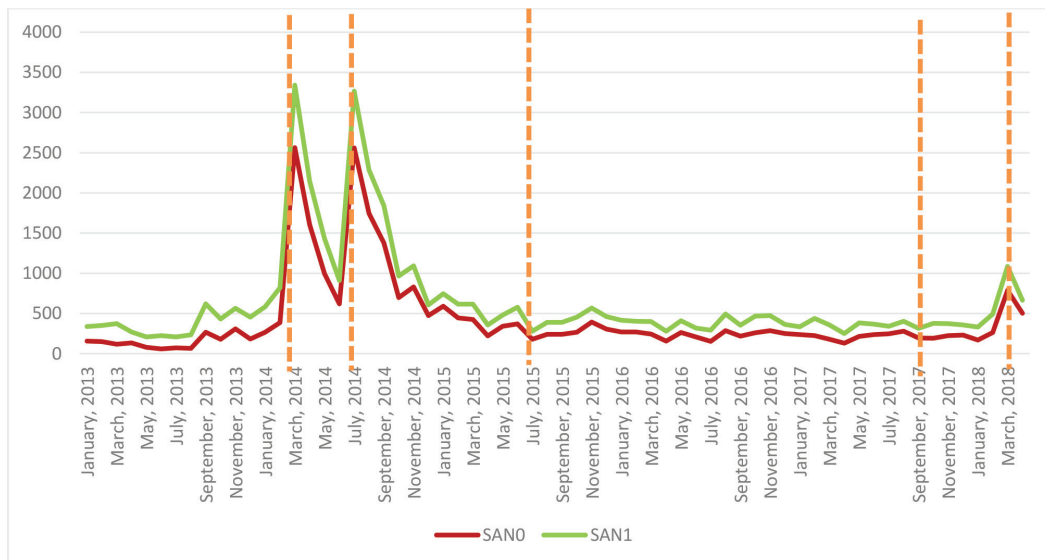
Fig. 2. Dynamics of changes in the developed sanction indexes (SAN0 and SAN1)
for the period from January 2013 to March 2018

In order to study the impact of the developed anti-Russian sanctions indexes on the Russian stock market, we analysed the relationship between the changes in the Moscow Exchange Index (MOEX), the US dollar exchange rate against the Russian rubble and the three indexes covered in the work, constructed using different methodologies. The relationship was investigated using a causal testing methodology.

The correlation matrix of the considered indicators is presented in Table 2.

Table 2. Correlation matrix of developed indexes and financial market indicators

	MOEX	RATE	SAN0	SAN1	INDEX
MOEX	1.000000	0.531639	-0.425972	-0.424022	0.914456
RATE	0.531639	1.000000	-0.470042	-0.477962	0.647189
SAN0	-0.425972	-0.470042	1.000000	0.990634	-0.477624
SAN1	-0.424022	-0.477962	0.990634	1.000000	-0.476544
INDEX	0.914456	0.647189	-0.477624	-0.476544	1.000000

The presented correlation matrix allows us to see that the SAN0 and SAN1 indexes developed by the authors have a negative relationship with both the MICEX

index and the US dollar against the Russian rubble. In other words, a decrease in the number of references to Russia and anti-Russian sanctions in the texts of foreign media leads to an increase in the MICEX index, as well as an increase in the dollar against the rubble. It can also be noted that the cumulative sanctions index proposed by the authors has a close positive relationship with the MICEX index, which confirms the hypothesis that it is not practical to use it. Such a relationship suggests that an increase in the number of anti-Russian sanctions contributes to the growth of the MICEX index, which contradicts the logic of judgments and the real situation.

The application of the methodology for constructing a standard regression with respect to the considered indicators made it possible to confirm the findings. The authors revealed that the cumulative sanctions index is not significant in the process of modelling the dynamics of the MICEX index. At the same time, the developed SAN0 and SAN1 indexes, reflecting the coverage of Russia and the imposed sanctions in foreign media, showed high significance.

The MICEX index model was built on the assumption that the effect of coverage of the introduction of sanctions restrictions in foreign media on the financial market is not immediate; it takes some time before the financial market indicators begin to respond to the information received. The consistent construction of models with different lags for SAN0 and SAN1 indicators revealed that the MICEX index responds to information presented in foreign media with a delay of 10 days. The results are presented in Table 3.

Table 3. Building a model of the dependence of the MICEX index on the developed indexes SAN0 and SAN1

	Coefficient	Std. Error	t-Statistic	Prob.
RATE	2.301799	0.272358	8.451364	0.0000
SAN0(–10)	0.385350	0.231589	1.663934	0.0963
SAN1(–10)	-0.448982	0.180336	-2.489695	0.0129
@TREND	0.554858	0.006411	86.55064	0.0000
C	1282.315	14.95289	85.75702	0.0000
MA(1)	0.881599	0.012083	72.96127	0.0000
R-squared	0.965103			

All factors unaccounted for explicitly in the econometric model accumulate in a random term et. In classical econometrics, this would mean the need to search and take

into account such factors, but in this case, since the MICEX index is a time series, this is not necessary. We take into account the fact that unaccounted factors also have the inertia property, which means that it is enough to try to take into account the lagged structure of a random term, so 1 lag is added to the equation. A linear trend is also added to the equation.

Summing up, we can conclude that the cumulative sanction index proposed in the economic literature, despite the presence of positive characteristics, is not applicable in order to measure the effect of the sanctions introduced on changes in the financial market. To achieve this goal, it is advisable to use the anti-Russian sanctions coverage indexes proposed by the authors in foreign mass media, which have demonstrated high significance in the process of modelling changes in the MICEX index, taken as a key indicator reflecting the state of the Russian financial market.

Conclusion

Sanctions as a tool of economic and political influence have a significant impact on all aspects of the functioning of the country, including the financial market. One of the current research areas is the development of indexes that allow quantifying the impact of the imposed sanctions on various macroeconomic indicators.

The authors of this work analysed the dynamics of changes in the Russian financial market under the influence of restrictions imposed by foreign countries. The Moscow Exchange Index was taken as a dependent variable. To quantify the impact of restrictions, a system of indexes was developed, from various sides, characterizing the ongoing sanctions policy. The first group of indexes reflected the cumulative effect of all sanctions measures taken against Russia. As a result of the study, it was found out that despite wide coverage and a high degree of reliability, these indexes cannot be used in analysing the dynamics of the financial market and have a low degree of significance in the process of modelling the MICEX index.

The second group of indexes, developed by the authors, characterized the impact of sanctions through an assessment of Russia's coverage and anti-Russian sanctions in foreign media. Based on the modern methodology of text analysis, these indexes have demonstrated a high degree of significance and an adequate relationship with the Moscow Exchange index. It was revealed that references to Russia and anti-Russian sanctions in foreign media with a lag of 10 days have an impact on the dynamics of the Russian financial market, which must be taken into account in the process of modelling its behaviour. Thus, the proposed indexes make it possible to

quantitatively measure the impact of anti-Russian sanctions on the performance of the Russian financial market.

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Анализ влияния санкций

на российский финансовый рынок

на основе разработки санкционных индексов

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Антироссийские санкции признаны одним из ключевых факторов, определяющих состояние российской национальной экономики в последние годы. Разновидностью санкций стали финансовые ограничения, вводимые против компаний и физических лиц, сужающие возможности привлечения иностранного финансирования и ограничивающие взаимодействия с зарубежными инвесторами. Подобные события не могли не отразиться на состоянии российского финансового рынка. Целью представленной работы является определение влияния антироссийских санкций на финансовый рынок России в период с 2014 по 2018 год. Для достижения поставленной цели авторами были разработаны индексы, позволяющие количественно выразить вводимые против России санкции со стороны различных иностранных государств. При этом индексы были рассчитаны не только для всей совокупности ограничений, но и отдельно для санкций, вводимых различными блоками стран (США, Европейским союзом и прочими странами). Построенные индексы также позволяют учесть степень влияния конкретных санкционных мероприятий исходя из уровня объекта, против которого были введены ограничения. Рассмотрение указанных индексов во взаимосвязи с изменением индекса ММВБ позволило установить существование высокой степени зависимости динамики российского финансового рынка и вводимых санкционных ограничений и обосновать предлагаемый подход к расчету индексов.

Ключевые слова: российский финансовый рынок, санкции, антироссийские санкции, влияние санкций, индекс влияния санкций.