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CRISIS MANAGEMENT OF EXCHANGES: THE EXPERIENCE OF FOREIGN COUNTRIES AND THE POSSIBILITY OF APPLICATION IN THE RUSSIAN FEDERATION

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Abstract

The purpose of this study is to solve the issues of developing and applying a certain set of measures of stock markets crisis management in the Russian Federation. Thus, the main task is to develop a specific set of methods for crisis management to be used on Russian exchanges. The research is conceptually based on the E. Fama hypothesis of effective markets, as events trigger a crisis as a reaction to their positive (more often, negative) content. The method in its general sense is statistical indicators, and specifically the levels of standard deviation (emissions as a criterion for a crisis situation). The analysis of both the concept of crisis management and of various methodological approaches and measures applied in foreign practice was carried out. Thus, the research resulted in the development of a model for ensuring the liquidity of the Russian Federation's stock market, which is presented as a set of methods of crisis management. Despite the methodological uncertainty of the very term ‘anti-crisis management’ in the works of Russian scientists, the authors note that crisis management is a set of various measures to restore the stable operation of the exchange and its liquidity, which can be compared with measures applied in foreign countries. At the same time, it is necessary to create an individual set of anti-crisis measures for the domestic practice of managing exchanges.

Keywords

Crisis – Crisis management – Methods – Stock market – Exchange – Prices – Collapse

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Introduction

Relevance: the financial market is an important component of the world economy, a center for the accumulation and rational distribution of monetary resources among economies, industries, business entities, etc. The exchange market (as a part of financial market) is characterized by organization and mediation, as well as a number of clearly established rules. The collapse of the stock exchange usually leads to the collapse of the country's economy or the world economy as a whole. Therefore, it is possible to note the works of such authors as Nassim Taleb (the 'black swan' theory – unpredictable negative socio-economic events affecting the activity of the exchange ('black swans'), and indicating the weakness of the tools for predicting the consequences of these events)[1]; G. Soros (the theory of reflexivity revealing the behavioral factor (herd behavior) and its irrationality)[2]; N.D. Kondratiev and S. Glazyev (theory of cycles and their impact on the price conjuncture of the exchange)[3].

Setting objectives. Crisis, as known, is difficult to predict, so it comes unexpectedly in most cases, making crisis management of stock exchanges topical. In addition, inevitability is a characteristic of a financial crisis. Marx said, "Crisis is an integral feature of the capitalist economy"[4]; thus, crisis management is an integral part of stock exchange activities, and the problematic issue is identifying the onset of an inevitable crisis.

Therefore, the research task is developing a specific set of crisis management methods to use on Russian exchanges.

The purpose of the study is to link the actions on the anti-crisis management of the state (aimed in particular at preventing collapse of exchange quotations) with the actions of exchange entities seeking to predict the movement of prices for underlying assets.

Materials and Methods

Review of literature and research. The problem was studied by such scientific figures as: L. V. Zgodnik, V. A. Chernenko, N. Yu. Shvedova, M. V. Kaimakova, S.N. Bychkov, A. A. Grigoryan, E. V. Shikin, G.E. Shikina, and many others (Table 1).

The conducted analysis of the scientific literature reveals no single and generally recognized concept of anti-crisis management. In addition, it is necessary to find out whether the stock exchange is able to get out of the crisis, and how this problem was solved abroad.

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[1] A. M. Abetkanyan; A. M. Abetkanyan & Y. N. Popovski, "Anti-crisis enterprise management in modern conditions". Economic aspects of technological development of modern industry, (2017): 8-11. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=32396009

[2] R. Ahmad; O. F. Etudaiye-Muhtar; B. Matemilola & A. N. Bany-Ariffin, "Financial market development, global financial crisis and economic growth: evidence from developing nations". Portuguese Economic Journal, num 15 (3) (2016): 199-214.

[3] V. G. Akulich, Innovative approaches to economic development. Monograph (Odessa, 2015)
A. Baibakov "The last Black Monday". Kommersant, num 22 (2004): 70. Retrieved from: https://www.kommersant.ru/doc/480951

[4] A. Y. Borisov, "Behavioral finance as a new stage of development of financial science". Economics and entrepreneurship, num 85-4 (2017): 144-147. Retrieved 03.04.2018 from: https://elibrary.ru/item.asp?id=30550216

Author	**Work**	**Definition of anti-crisis management**
1	2	3
M. V. Kaimakova	Anti-crisis Management	Anti-crisis management lies in designing and implementing a strategy of development of the state and society aimed at overcoming crises and ensuring the equilibrium between the economic system and the state system. The role of anti-crisis regulation lies in creating a system of interaction between the state and a market economy that ensures the overcoming of macro- and microeconomic crises.
S.N. Bychkov, A.A. Grigoryan, E.V. Shikin, G.E. Shikina	On Some Issues of Anti-crisis Management	Anti-crisis management is one way out or another of a crisis.
Subachev A.A., Karasev M.A.	Anti-crisis Management (workbook)	Anti-crisis management aims at forecasting the danger of a crisis, identifying the crisis, analyzing its symptoms, developing measures to reduce its negative and to use its factors for further development. This is a system of management measures to diagnose, prevent, neutralize and overcome crisis phenomena at all the levels of the economy[5].
Shubtsova L.V.	State Anti-crisis Management: Systematic Approach	Anti-crisis management is part of the overall system of public administration, including forecasting and timely diagnosis of crises, analyzing their causes, identifying priority measures to curb crisis phenomena, and developing a comprehensive program to overcome crisis and restore sustainable economic growth[6].
Glushchenko V.V.	State Anti-crisis Management on the National Stock Market	Anti-crisis management is methods designed to minimize the risk of a crisis in a given market or in other markets[7].
Okhotsky E.V.	State Anti-crisis Management	Anti-crisis management is creating an environment in which risks, dysfunctions and defects can be identified and scientifically diagnosed beforehand[8].

Table 1
Analysis of the term 'Anti-crisis management'

Compiled by the authors based on: [9].

[5] A. M. Abetkanyan; A. M. Abetkanyan & Y. N. Popovski "Anti-crisis enterprise management in modern conditions". Economic aspects of technological development of modern industry, (2017): 8-11. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=32396009

[6] R. Ahmad; O. F. Etudaiye-Muhtar; B. Matemilola & A. N. Bany-Ariffin, "Financial market development, global financial crisis and economic growth: evidence from developing nations". Portuguese Economic Journal, num 15 (3) (2016): 199-214.

[7] V. G. Akulich, Innovative approaches to economic development. Monograph (Odessa, 2015).

[8] A. Baibakov "The last Black Monday". Kommersant, num 22 (2004): 70. Retrieved from: https://www.kommersant.ru/doc/480951

[9] E. F. Fama & R. F. Kenneth "Value versus Growth: the International Evidence", The journal of finance, Vol: 58 num 6 (1998): 1975-1999. Retrieved 12.02.2018 from: http://pages.nes.ru/agoriaev/Papers/Fama-French%20Value%20vs%20Growth-%20International%20Evidence%20JF98.pdf; S. Glazyev "The World Economic Crisis as a Process

Is it possible to use the above-mentioned experience in the conditions of the RF? In addition, signs (preferably discrete criteria) of a crisis must be determined.

Below are descriptions of the study hypothesis (an assessment of the possibility to use foreign crisis management methods); according to the authors of the present study, they are broken down into several sub-hypotheses (the research plan and methods):

1) H_0^1 – exchanges, being self-organizing, do not require anti-crisis management and are able to independently exit the current situation;

2) H_1^1 – exchanges, despite being self-organizing, require anti-crisis management and are not able to independently exit the current situation;
The methods applied include: analysis (literary sources), comparison (anti-crisis measures of different countries).

3) H_0^2 – methods of anti-crisis management of stock exchanges in developed countries can be applied without restrictions in domestic practice;

4) H_1^2 – methods of anti-crisis management of stock exchanges in developed countries cannot be applied (without restrictions) in domestic practice;

The methods applied include analysis (the possibility of applying the experience of foreign countries in Russia), comparison (methods of crisis management).

5) H_0^3 –, no specific boundaries (discrete quantities) exist as a criterion for a crisis;

6) H_1^3 – statistical boundaries (standard deviation levels) can be used as a criterion a crisis;

The methods applied include analysis (statistical recognition analysis), comparison of statistical indicators: standard deviation of the price; price change; weighted average price; the maximum (minimum) price as a criterion for the crisis on the stock exchange).

All the above methods are generally accepted and widely used because of the simplicity and reliability and the unambiguousness of the results obtained.

All the materials are taken from open sources (exchanges, agencies, etc.).

Results

In crisis management of exchanges, the leaders are developed countries such as the USA, Japan, China, Germany, Great Britain and others where the world's main exchanges are located. Each crisis is unique: different scales with different causes and consequences and, as a result, the measures taken to restore the economy.

Table 2 presents a comparative analysis of the most large-scale crises; having studied them, one can observe certain regularities.

The analysis revealed that the crucial problem and prerequisite for each crisis is untimely implementation of the government's anti-crisis measures, a decrease in market

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of Changing Technological Styles". Voprosy ekonomiki, num 3 (2009); V. V. Glushchenko "State crisis management in the national securities market". Finance and credit, num 44 (332) (2008): 11-18. Retrieved 29.05.2018 from: https://cyberleninka.ru/article/v/gosudarstvennoe-antikrizisnoe-upravlenie-na-natsionalnom-rynke-tsennyh-bumag y O. Gök & S. Peker "Understanding the links among innovation performance, market performance and financial performance". Review of Managerial Science, num 11 (3) (2017): 605-631.

liquidity, as well as unconscious investor actions, and panic in the exchange market; therefore, the hypothesis of the exchange's inability to cope with the crisis is confirmed.

The data from Table 2 shows that the causes of the crisis are factors that lie outside the exchange's competencies, and therefore the exchange cannot come out of the crisis without state intervention.

The data demonstrate that crisis management is effectuated by: state bodies, authorities, central banks, federal agencies, in particular the Federal Reserve System; in Russia, the Accounting Chamber performs this function. Anti-crisis measures are similar in each country yet differ in the methodology of implementation, the country's capabilities, perception, subsequent development and results.

№	Crisis	Causes	Degree of influence on the	Measures of anti-crisis management
1	2	3	4	5
1	The Great Depression in the USA (1929-1933)	1. Abundance of goods produced; 2. Large increase in population; 3. 'Barrage measures' introduced in the USA by the Smoot-Hawley Tariff Act in 1930;[10] 4. Large part of the population engaged in playing the stock market; 5. Production going broke; 6. Increase in unemployment due to automation of production; 7. Decrease in market liquidity; 8. The majority of the population living below poverty line; 9. The First World War; 10. Marginal loans; 11. Rapid economic growth; 12. Hidden inflation[11].	World crisis	1. The US Congress created the Reconstruction Finance Corporation (RFC). This organization provided financial assistance to railways, financial institutions and corporations; 2. The Federal Home Loan Bank Act which provided loans to organizations engaged in mortgage lending; 3. Liberalization of the FRS; 4. Budgetary redistribution of income from the rich to the poor; 5. Roosevelt's New Deal; 6. Involvement of the unemployed in public works; 7. The state resolutely invaded the sphere of education and healthcare, guaranteed living wage, committed itself to providing for the elderly, the disabled people and the poor; 8. The dollar strictly dependent on the gold standard.

[10] A. Y. Borisov, "Behavioral finance as a new stage of development of financial science". Economics and entrepreneurship, num 85-4 (2017): 144-147. Retrieved 03.04.2018 from: https://elibrary.ru/item.asp?id=30550216

[11] E. F. Fama & R. F. Kenneth, "Value versus Growth: the International Evidence". The journal of finance, Vol: 58 num 6 (1998): 1975-1999. Retrieved 12.02.2018 from:

2	The Japanese stock market crash (1929-1933)	1. Rapid speculative price increase in the Japanese real estate market and the stock market; 2. Untimely activity of the government and the bank in combating the crisis; 3. Decrease in market liquidity; 4. Speculative boom.	National crisis	1. The government buying 'bad debts'; 2. Policy of quantitative easing – buying securities from the market; 3. The state authorities adopted the program on guaranteeing deposits and lending to banks. Panic after the collapse was the result of the government's untimely activity.
3	Black Monday (October 19, 1987)	1. Putting into operation and trusting analytical machines that carried out trading calculations, at the initial stage of their implementation; 2. Unattractiveness of US shares for investors. 3. Behavior and strategies of exchange market participants (speculation); 4. General political and economic instability in the country; 5. Inconsistency of the monetary policy of the G7 countries; 6. Credit indebtedness; 7. Withdrawal of the dollar mass from the trading platform; 8. Difficult international financial situation; 9. Revaluation of shares; 10. Pentagon's heavy military spending; 11. Lack of structural changes in the economy; 12. Rising oil prices.	World crisis	1. The FRS provided the market with additional liquidity (including through additional issuance of government securities); 2. Banks gave additional financing to firms that provided services for trading on the stock market; 3. Significant changes in the rules of exchanges operation, based on the US experience; 4. New rule was introduced: the auction was to be stopped for an hour if the Dow Jones index was down more than 250 points a day and for two hours if the drop exceeded 400 points. 5. Modernization of own computer and trading systems.[12].

http://pages.nes.ru/agoriaev/Papers/Fama-French%20Value%20vs%20Growth-%20International%20Evidence%20JF98.pdf

[12] Sanford J. Grossman, "An Introduction to the Theory of Rational Expectations Under Asymmetric Information". Review of Economic Studies, Vol: 48 (1981): 541-559. Retrieved 29.05.2018 from: https://academic.oup.com/restud/article-abstract/48/4/541/1595966?redirectedFrom=fulltext

4	Mortgage crisis in the USA (2007-2008)	1. Regulatory policy miscalculations; 2. Inflating the profit 'bubble' by the private sector; 3. Growth of foreign investment in the US economy; 4. Change in the legislative regulation of the banking system; 5. Fall in property prices; 6. High offer in the residential real estate market; 7. Refusal to pay; 8. Obsolete policy of financial regulation; 9. Collusion of economic entities.	World crisis	FRS actions: 1. Decreasing the target rate for federal funds from 5.25% to 2% in six stages (September 18, 2007 - April 30, 2008); 2. Implementing operations on the open market to ensure liquidity of banks that are part of the FRS; 3. Establishing programs to provide loans directly to banks and non-bank credit institutions; 4. Creating a program to purchase mortgage securities from enterprises with state participation to reduce mortgage rates. Economy stimulation: 5. George W. Bush signed a bill according to which the state allocated 168 billion USD to stimulate the economy; 6. Barack Obama signed the law 'On the restoration and reinvestment of the American economy' for reducing the tax burden on the population and increasing the size of government spending to 787 billion USD. Assistance to banks: 7. To help the banking sector, the US government in October 2008 approved the law 'On urgent measures to stabilize the economy'; 8. In March 2009, US Treasury Secretary T. Geithner announced a plan to purchase toxic assets from banks; 9. Financial assistance to companies; 10. Assistance to homeowners; 11. Changing the system of financial regulation.

5	Exchange crisis in China (2015)	1. Opening a large number of investment accounts, most of which belonged to investors who did not finish school; 2. Authorization to trade on borrowed funds (16% of the market); 3. 'Overheated' economy; 4. Untimely response from the government; 5. Decrease in market liquidity.	National crisis	1. The People's Bank of China announced a reduction in interest rates and reserve requirements; 2. The Chinese Central Bank promised additional financial assistance to companies buying shares in the market; 3. The Chinese authorities intend to create a stabilization fund; 4. On July 8, China imposed a ban on selling shares of state companies in stock markets, trying to 'pay off anomalous fluctuations in the domestic market'; The policy of anti-crisis measures implemented did not yield the necessary results.

Compiled by the authors based on:[13].

Table 2

Comparison of anti-crisis measures of different countries in a state of crisis

There are three global variants of anti-crisis measures (see Figure 1)[14].

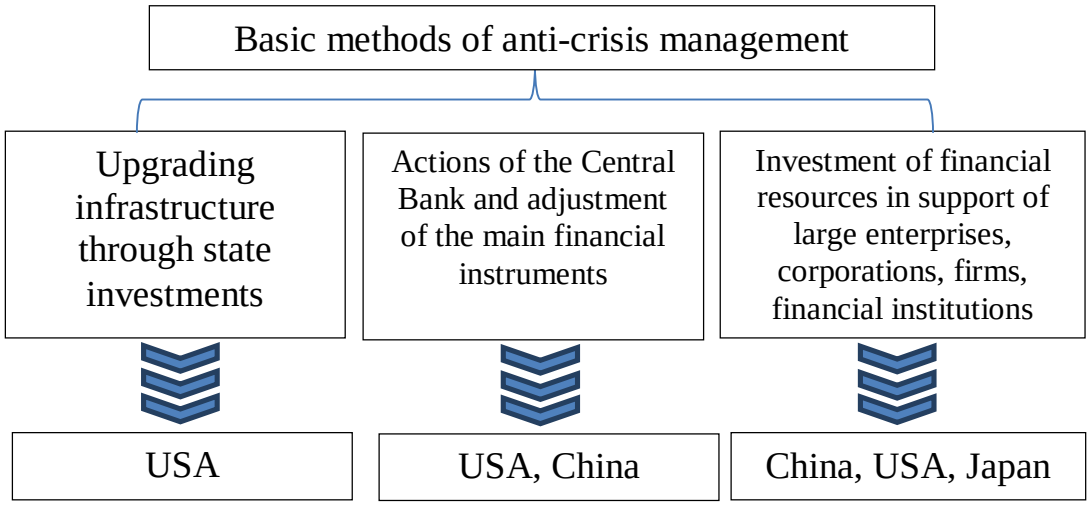


Fig. 1. Methods of anti-crisis management

[13] Sanford J. Grossman, "An Introduction to the Theory of Rational Expectations Under Asymmetric Information", Review of Economic Studies, Vol: 48 (1981): 541-559. Retrieved 29.05.2018 from: https://academic.oup.com/restud/article-abstract/48/4/541/1595966?redirectedFrom=fulltext y M. V. Guminenko, "The Great Depression in the United States: a look at the probable reasons", Literature and life, (2009). Retrieved 24.05.2018 from: http://dugward.ru/history/Hist5.html

[14] M. V. Guminenko, "The Great Depression in the United States: a look at the probable reasons", Literature and life, (2009). Retrieved 24.05.2018 from: http://dugward.ru/history/Hist5.html y S. M. Guriev, "Global anti-crisis measures in Russia and the United States", Economic journal, (2013). Retrieved 29.05.2018 from: https://bbf.ru/magazine/12/3832/

The number of anti-crisis measures undertaken by countries, as well as their essence, depends on the severity of the crisis, the degree of variability of the external environment, information security, its scale and state capabilities. In the United States, all the methods are often used in combination, since the collapse of US stock markets entails a collapse of the entire world economy[15]. D.V. Manushin[16] defines the following classification of anti-crisis measures (see Figure 2).

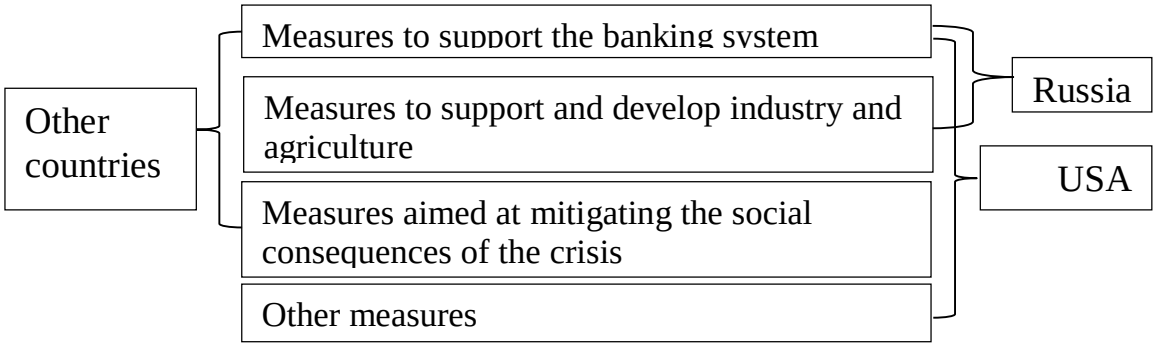


Fig. 2. Classification of anti-crisis measures by D.V. Manushin

Let us consider each undertaken method of anti-crisis management to define the ones that lead to a positive result and are applicable for the Russian stock market (see Table 3).

Table 3 reveals follows that most of the anti-crisis measures developed and approved by foreign countries will also work effectively in Russia, with the exception of a small number. The null hypothesis is confirmed in this case: the methods of crisis management of stock exchanges in developed countries can be applied in domestic practice without restrictions.

To develop anti-crisis measures and to understand what each of them should aim for, it is necessary to study the stock market as a whole[17].

The main function of the stock market is liquidity, manifested in the issuance of securities, the attraction of traders, a large number of trading volumes as a result of which the seller or buyer gets what they came for - profit.

At the onset of a crisis, the opposite phenomenon is observed; thus, anti-crisis measures should be aimed at ensuring the liquidity of the stock market, its restoration and maintenance. The common weak element of all the approaches is to determine the onset moment.

[15] S. M. Guriev, "Global anti-crisis measures in Russia and the United States", Economic journal, (2013). Retrieved 29.05.2018 from: https://bbf.ru/magazine/12/3832/

[16] D. V. Manushin, "Modern classification of Russian state anti-crisis measures", Bulletin of the Astrakhan State Technical University, num 2 (2011).

[17] Z. N. Idrisova; R. G. Kirillova & A. T. Sitdikov, "Crisis management of industrial enterprise". Economy. Innovation and entrepreneurship (collection of scientific papers). Ufa, 2016. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=28953495

Anti-crisis measures of foreign countries	Yes/No	Implementation of these measures in Russia
1	2	3
Federal Home Loan Bank Law, which should provide loans to organizations involved in mortgage lending.	APPLICATION NOT POSSIBLE	In the Russian Federation, the concept of 'property prices collapse' does not exist; at this stage the number of new buildings is increasing, but prices are practically unchanged (interest on mortgages is higher than in Western countries, and low income of the population ensures the impossibility of such phenomenon)[18].
Activation of budgetary redistribution of income from the rich to the poor.		In the Russian Federation, there is no clear distinction between the rich and the poor. The number of the former is limited – officials, oligarchs, private businesspersons who conceal the size of their incomes. As a result, this type of anti-crisis measures is not possible in Russia.
Currency is strictly dependent on the gold standard.		The reason is small stocks of gold ($ 45 billion USD out of $ 2 trillion USD) in the country, and most of the money is tied to oil or gas.
Additional issue of state securities of the Central Bank.	APPLICATION POSSIBLE	
Allocation of funds to stimulate the economy.		
Involving the unemployed in public works.		
Liberalization of the FRS		
US Congress creating the Reconstruction Finance Corporation (RFC).		
Government purchasing 'bad debts'.		
Policy of 'quantitative easing' – the purchase of securities from the market.		
State adopting the program on guaranteeing deposits and lending to banks.		
Modernization of own computer and trading systems.		
Providing the Chinese Central Bank with additional financial assistance to companies buying shares in the market.		
China ban on selling shares of state-owned companies in the stock markets (with the aim of 'paying off anomalous fluctuations in the domestic market').		Effective measures to exit the crisis (reducing unemployment, providing the unemployed with incomes, freeing the CB RF from tight restrictions, ensuring the restoration of production, helping enterprises out of bankruptcy, economic recovery).

Compiled by the author based on: Akulich V. G. Innovative approaches to economic development. Monograph. Odessa; 2015. 219.

Table 3

Analysis of the possibility of applying the experience of foreign countries in Russia

[18] S. Glazyev, "The World Economic Crisis as a Process of Changing Technological Styles", Voprosy ekonomiki, num 3 (2009).

The crisis is usually fought afterwards, which entails significant economic losses. In order for the crisis to be identified at an early stage, statistical methods and, correspondingly, earlier response by using different scenarios are to be employed[19]. In order to determine this statistical criterion, it is necessary to first determine the causes of the crisis on the stock market. Table 2 reveals that the causes of crises are varied and differ significantly from country to country, yet they all have a common feature: they are the result of a market mechanism violation, that is, they are derivatives. There are three forms of information efficiency: strong, medium, weak, depending on which information was taken into account by the market in the formation of prices (according to E. Fama[20]). If all the available information (historical, public and insider) is taken into account, one speaks of its strong form. This situation is inherent only in a perfectly competitive market where all the information is readily available, and receiving it does not entail any additional costs, it spreads quickly and evenly among all participants. Therefore, the form of information efficiency of the stock market should be the same for all. In a perfectly competitive market, even having insider information one cannot obtain a significant advantage in trade, which contradicts the reality – insider trading is prohibited in all countries[21]. Thus, the stock market may be both perfectly competitive and imperfect in form[22]. At the same time, the number of basic types of market structures is four, while that of the forms of information efficiency is three; this classification has to expand due to the zero form of market efficiency.

Discussion

The following indicators are used to characterize the prices dynamics and fluctuations for stock securities:

- standard price deviation;
- price change;
- weighted average price;
- the maximum (minimum) price.

The change in the price of an individual share cannot characterize the onset of a crisis (especially that the reaction may be reversed, depending on the β-coefficient)[23]. For these purposes, the stock exchange index (which in principle is a weighted average price), as well as the maximum (minimum) value, are more appropriate.

[19] V. P. Ivanitsky & S. A. Aleksandrov, “Formation of behavioral Finance as a natural stage in the evolution of the human model in the economy”, Economy of region, Vol: 13 num 3 (2017): 658-671. K. Marx, Theories of Surplus Value. Part II (Moscow: Progress Publishers, 1975)

[20] E. F. Fama & R. F. Kenneth, “Value versus Growth: the International Evidence”. The journal of finance, Vol: 58 num 6 (1998): 1975-1999. Retrieved 12.02.2018 from: http://pages.nes.ru/agoriaev/Papers/Fama-French%20Value%20vs%20Growth-%20International%20Evidence%20JF98.pdf

[21] D. V. Manushin, “Modern classification of Russian state anti-crisis measures”, Bulletin of the Astrakhan State Technical University, num 2 (2011).

[22] M. T. Nurmaganbetova, “Scope of anti-crisis government al management: nature and structure functional orientation”, Turan University Reports, num 2 (66) (2015): 189-193. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=27371449

[23] E. V. Okhotsky, State anti-crisis management: textbook for bachelor's and master's degrees (Moscow: Yurayt Publishing House, 2017) Retrieved 28.05.2018 from:: http://urait.ru/uploads/pdf_review/978-5-9916-8278-7.pdf

Yet in a highly volatile market, extreme values are also of little use (as are the averages)[24]. Among the above statistical indicators, the standard deviation of the index (not of the price) is the most suitable criterion for the crisis on the stock exchange. This indicator characterizes the crisis that has already happened and its scale, for instance, Black Monday on October 19, 1987, the crisis of the New York Stock Exchange when the Dow Jones index dropped at more than 20 standard deviations[25]. However, the criteria need to be determined separately, and here the rule of three sigmas can be used: the probability that the random variable deviates from its mathematical expectation by a larger amount than the tripled standard deviation is practically zero. The rule is valid only for random variables distributed according to the normal law. Naturally, if the stock market has no external impact, the dynamics of the rates should be close to the normal distribution. Otherwise, the distribution will be violated and the number of emissions will increase (the so-called 'heavy tails' growth). At the same time, other indicators (mode, median, kurtosis, and asymmetry) will also change, but due to their specifics, the increase in crisis trends will not be so clear on these daily quotes[26].

Accordingly, the standard deviation is taken as a criterion for starting a scenario (according to the first hypothesis), but the statistical limits of this indicator are to be determined. To do this, one has to link the levels of standard deviation, previously defined market efficiency forms and the causes of a crisis as a market reaction to an event (see Table 4).

Based on the table, an algorithm for applying standard deviation scenarios as a criterion for identifying a stock market crisis is formulated.

Figure 3 presents a systemic view of this approach and the formation of scenarios to restore the normal operation of the exchange in the post-crisis period and shows three levels of impact (where S is the standard deviation of the exchange index).

Legend:

3S, 2S, 1S – the size of the change in the stock index, expressed in standard deviations;
"+" and "-" – positive or negative deviation dynamics;
A, B, C – stages of the implementation of scenarios (A – initial, B – next and C – final).
This system will allow corrective measures before the fall of markets begins and becomes irreversible, avalanche-like. The proposed system assumes three levels of impact, depending on the predicted standard deviation of the exchange index:

1) Mild scenario (prediction of deviation of 1S);

[24] S. A. Okun, "Review of theoretical concepts of financial assets pricing", Financial Analytics: problems and solutions, num 20 (302) (2016): 2-17. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=26040916
O. V. Sergienko, "New stage of development of anti-crisis management of economy of Russia". Saratov State Social and Economic University Reports, num 1 (55) (2015): 59-63. Retrieved 16.04.2018 from: https://elibrary.ru/item.asp?id=23752630

[25] O. Shadi, "Analysis of the effectiveness of the Russian stock market". G. V. Plekhanov Russian University of Economics Reports, num 6 (69) (2017): 90-95. Retrieved 17.04.2018 from: https://elibrary.ru/item.asp?id=32282092

[26] Z. Sheaffer & R. Mano-Negrin, "Executives' orientations as indicators of crisis management policies and practices", Journal of management studies, Vol: 40 num 2 (2003): 573-606. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=1496385

2) Medium scenario (prediction of deviation of 2S);

3) Tough scenario (prediction of deviation of 3S). Based on this, a system of measures can be presented in a table (see Table 5).

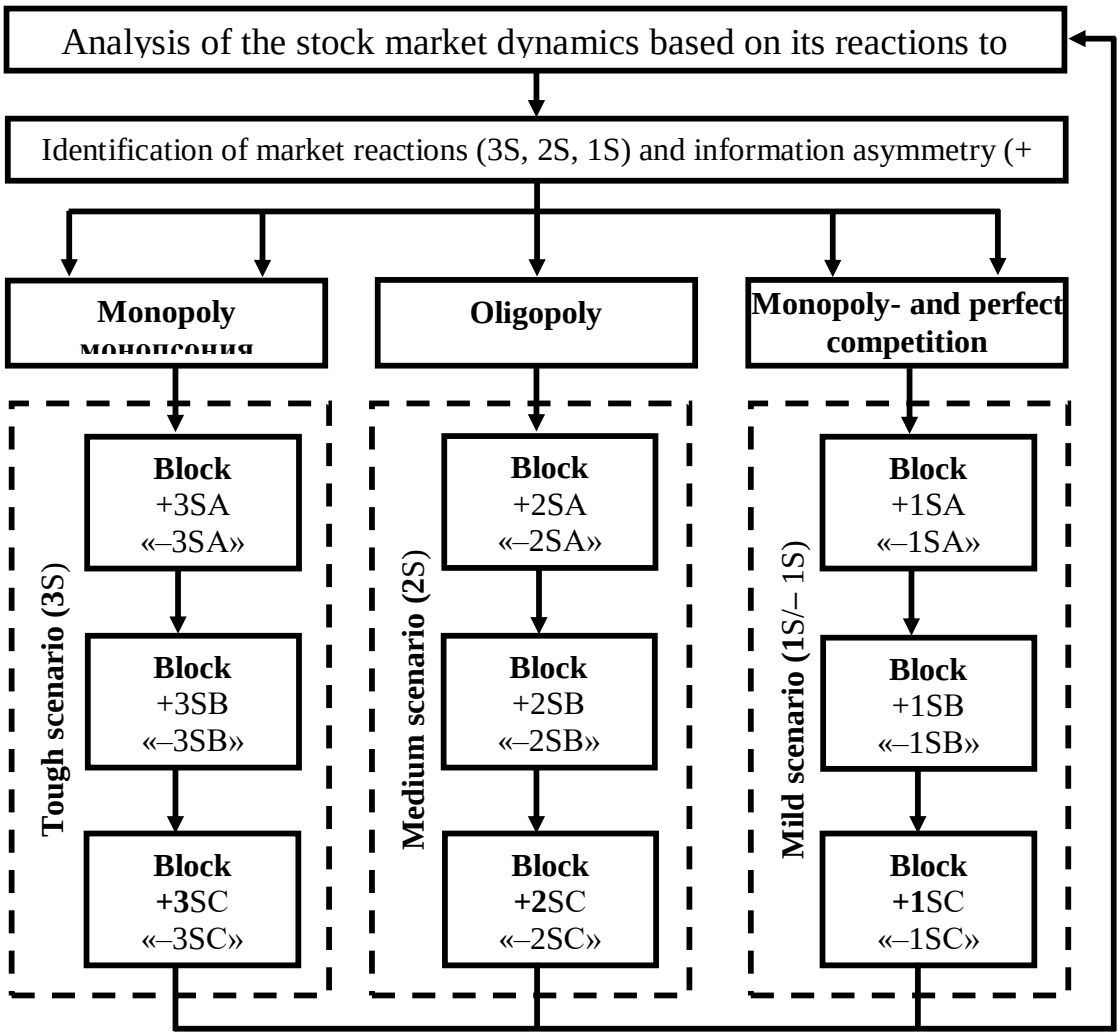
Characteristics of forms of efficiency	Forms of efficiency	mechanism of market trading	Types of market structures	Interconnection	Entropy of events	Market reaction	Cause of the crisis
The formed price takes into account all the existing information.	Tough	Generally informed trade	Perfect competition	The information set is complete, new information is instantly reflected in market prices	High	1 S	Since information is spread instantaneously, even unlikely events are perceived by the market with restraint, and the dynamics of the index is even
					Average	1 S	
					Neutral	1 S	
					Low	1 S	
The formed price takes into account public information.	Medium	Generally informed trade	Monopoly-competition	Imperfect information	High	1 S	Professionals have complete information, and the market being guided by them is stable and reacts to any news with restraint
					Average	1 S	
					Neutral	1 S	
					Low	1 S	
The formed price takes into account the historical data.	Mild	Partially informed trade	Oligopoly	Information asymmetry	High	2 S	Information is insufficient, volatility is growing amid the development of negative expectations
					Average	2 S	
					Neutral	1 S	
					Low	1 S	
The price is set by one market entity without regard for any information.	Zero (suggested by the authors)	Uninformed trade	Monopoly	Information is concentrated in the hands of one market entity; it is not subject to accumulation and	High	3 S	No information, panic moods are growing, any news is a ‘trigger’ to an abrupt (sometimes herd) reaction
					Average	3 S	
					Neutral	3 S	
					Low	3 S	

				distribution among market participants.			

Compiled by the authors based on[27]

Table 4

Standard deviation level, forms of market efficiency and the causes of a stock market crisis



Developed by the authors

Fig. 3

Scenarios for stock market development in case of changes in.

[27] Z. Sheaffer & R. Mano-Negrin, "Executives' orientations as indicators of crisis management policies and practices". Journal of management studies, Vol: 40 num 2 (2003): 573-606. Retrieved 29.05.2018 from: https://elibrary.ru/item.asp?id=1496385

W. Sheng & M. C. Sunny Wong, "Capital Flow Management Policies and Riskiness of External Liability Structures: the Role of Local Financial Markets", Open Economies Review, num 28 (3) (2017): 461-498.

Robert J. Shiller, The New Financial Order: Risk in the 21st Century (Princeton University Press, 2003) Retrieved 29.05.2018 from: http://www.library.fa.ru/files/Shiller1.pdf

- Mild scenario (1S / - 1S), the goal is to maintain the current situation.

1. Block + 1SA. A privilege on income tax from individuals acquiring securities in an organized market through professional participants in the securities market could serve as a promotion of the issuing and investment activity of enterprises, as well as an effective measure to attract investors to the stock market.

2. Block + 1SB. Stimulation of market makers, recommendations on dividend policy formation. For the functions of market makers, futures exchanges provide their members with a fixed remuneration or discounts from mandatory fees and payments.

3. Block + 1SC. Development of infrastructure, improvement of legislation, introduction of securitization, financial innovations, improvement of information disclosure, etc.

Stage / Character	A	B	C
1	2	3	4
Mild scenario (1S/- 1S). Objective: maintaining liquidity at the normal level (holding the index in the liquidity corridor)	Block + 1SA. Encouraging the issuing and investment activity of enterprises (for example, reducing tariffs, increasing the 'shoulder'), etc.	The block + 1SB. Stimulation of market makers, recommendations on the dividend policy formation.	Block + 1SC. Daily reports on infrastructure development, improvement of legislation and information disclosure, introduction of securitization, innovations, etc.
	Block -1SA. Following the 'calendar of official speeches'. Evaluation of event content and its registration.	Block -1SB. Preliminary event analysis of messages and their classification.	Block -1SC. Formation of the event stream and the day's event-factor, impulse identification, forecast level calculation (from -3 to +3).
Medium scenario (2S/-2S). Objective: inhibition of negative trends growth	Block + 2SA. Removing 'heavy issuers' from the index calculation; association of related enterprises in the 'stock cartel'; limiting the impact of blue chips.	Block + 2SB. Maintaining the current situation by protecting market entities from the impact of 'interested' individuals, etc.	Block + 2SC. Application of penalties; compulsory risk insurance, use of tax instruments to limit insider trading. Suspension of transaction clearing.
	Block -2SA. Evaluating the number of events per day (increase, decrease, no change), a single event or a massive increase in events.	Block -2SB. Determining the nature of negative content formation (random or artificial flow formation).	Block -2SC. Identifying the 'information/insider' attack: the definition of authorship, instruments and channels of influence, issuing warnings.

Tough scenario (3S/-3S). Objective: to stop the 'attack' to bring down panic and to 'cool' the market.	Block + 3SA. Interventions on the market (both foreign exchange and placements of domestic government loan bonds), increase/decrease of the discount (key) rate, automatic stopping of trades and quotations of individual issuers.	Block + 3SB. Implementation of a price change limit and its control, margin requirements, prohibition of 'short' sales.	Block + 3SC. Declaration of an emergency. Stopping the operation of the exchange (exchanges), to prevent a 'speculative' attack with a growing volume. Refund for suspended clearing.
	Block -3SA. Compensation of negative event content to prevent an information attack through a detailed analysis of negative messages in the special press by leading economists and businessmen, indicating the reasons, stakeholders and disclosure of instruments.	Block -3SB. Urgent systemic statements in the media by government officials, CBR leaders, the Ministry of Finance and Economics, urgent appeals of the Prime Minister and the President with guarantees to investors (when the negative trend intensifies).	Block -3SMA. Information counterattack: a subsystem of strict news content filtering with the accountability of the media, legal entities and individuals for the dissemination of false and unverified information, manipulation of facts, etc. (capable of damaging pricing in the FR), the obligatory refutation.

Table 5

System of measures to restore the stock market in the post-crisis period

4. Block -1SA. Following the 'calendar of official speeches'. Evaluation of event content and its registration. Calendar of publications of the country's macroeconomic indicators.

5. Block -1SB. Preliminary event analysis of messages and their classification.

6. Block -1SC. Formation of the event stream and the day's event-factor, impulse identification, forecast level calculation (from -3 to +3).

- Medium scenario (2S/-2S). Objective: inhibition of negative trends growth.

1. Block + 2SA. Removing 'heavy issuers' (those that can really influence the stock index) from the index calculation; association of related enterprises in the 'stock cartel' applying the corresponding procedures, namely considering their quotations at index calculation as one issuer; limiting the impact of blue chips.

2. Block + 2SB. Maintaining the current situation by protecting market entities from the impact of 'interested' individuals, etc.

3. Block + 2SC. Application of penalties; compulsory risk insurance, use of tax instruments to limit insider trading.

4. Block -2SA. Evaluating the number of events per day (increase, decrease, no change), a single event or a massive increase in events.

5. Block -2SB. Determining the nature of negative content formation (random or artificial flow formation).

6. Block -2SC. Identifying the 'information/insider' attack.

- Tough scenario (3S/-3S). Objective: to stop the 'attack' to bring down panic and to 'cool' the market.

1. Block + 3SA. Interventions on the market, increase/decrease of the discount rate, automatic stopping of trades and quotations of individual issuers.
2. Block + 3SB. Implementation of a price change limit and its control, margin requirements, prohibition of 'short' sales.
3. Block + 3SC. Declaration of an emergency. Stopping the operation of the exchange (exchanges), to prevent a 'speculative' attack with a growing volume. Refund for suspended clearing.
4. Block -3SA. Compensation of negative event content to prevent an information attack.
5. Block -3SB. Urgent systemic statements in the media by government officials, CBR leaders, the Ministry of Finance and Economics, urgent appeals of the Prime Minister and the President with guarantees to investors (when the negative trend intensifies).
6. Block -3SMA. Information counterattack: a subsystem of prudential supervision and strict news content filtering with the accountability of the media, legal entities and individuals.

The proposed methodology was applied on empirical data and a scenario of actions was defined; the RTS (the Russian Trading System) data (see Figure 4) for 10 years (May 15, 2008 - May 15, 2018) was used.

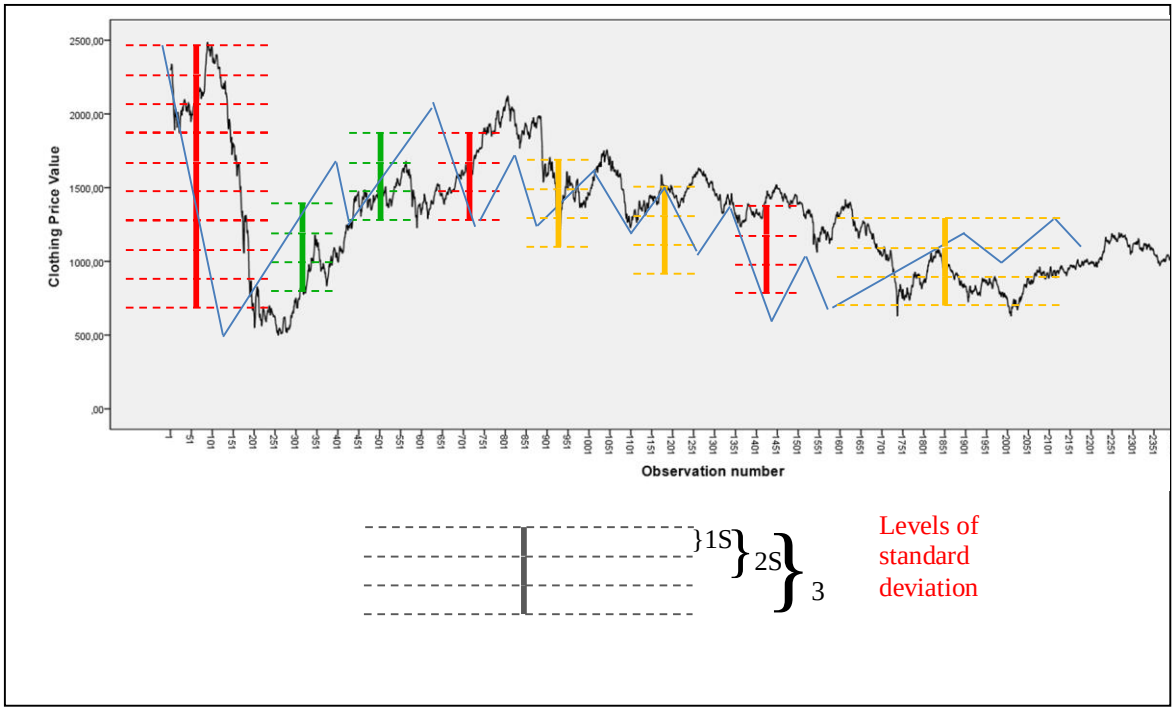


Fig. 4
Analysis of the exchange rate dynamics of the RTS index using the proposed methodology for identifying a crisis

The figure shows the graph of the RTS index with blocks of standard deviations: where the graph exceeds -3S, the blocks are red, the growth blocks are green, and the blocks in the areas with an undetermined trend are marked with yellow. The first red block contains 9 (!) standard deviations. If the proposed system of scenarios were applied, the fall

could be stopped, and the crisis would not have developed on this scale - its consequences have not been compensated for by the index growth; in fact, the market was thrown 10 years back.

Conclusion

Anti-crisis management is a set of various measures that can be compared with the measures applied in foreign countries; however, an individual set of anti-crisis measures is selected and developed in a certain country. Thus, the result of the study is the developed model of the mechanism for providing liquidity in the Russian Federation's stock market, which is presented as a set of methods of anti-crisis management.

The final stage of this work is the system of anti-crisis management of liquidity of the developing stock market proposed by the authors based on a set of tools for early diagnosis of crisis. In this study, a systematic allocation of optimal methods and tools to solve the problem of providing liquidity of the stock market is implemented and scenarios for its recovery are generated. The proposed system assumes three levels of impact, depending on the predicted standard deviation of the exchange index:

1) Mild scenario (prediction of deviation of 1S);
2) Medium scenario (prediction of deviation of 2S);
3) Tough scenario (prediction of deviation of 3S).

These scenarios, for ease of use, are tabulated, indicating the steps to implement a corrective action that is tailored to specific activities, both economic (including impact on insiders) and informational.

This approach will reduce the risks of negative consequences of various socio-economic events and has a great practical value, since it can be applied without significant costs and is of interest to a wide range of researchers, traders and specialists of state institutions regulating the activities of stock exchanges.

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Annex

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Diagram

Notes

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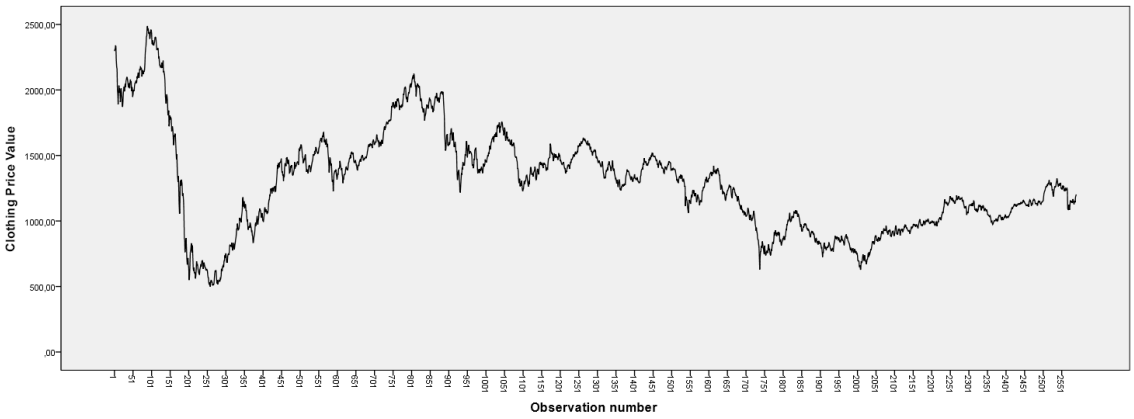


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Descriptive statistics

Notes

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Descriptive statistics

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	Statistics	Statistics	Statistics	Statistics	Statistics	Mean error	Statistics	Statistics	Statistics	Mean error	Statistics	Mean error
ClosingPrice	2590	1989.72	498.20	2487.92	1291.2337	7.56561	385.02945	148247.674	.508	.048	.070	.096
valid N (according to the list)	2590											

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Diagram

Notes

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Diagram
Notes

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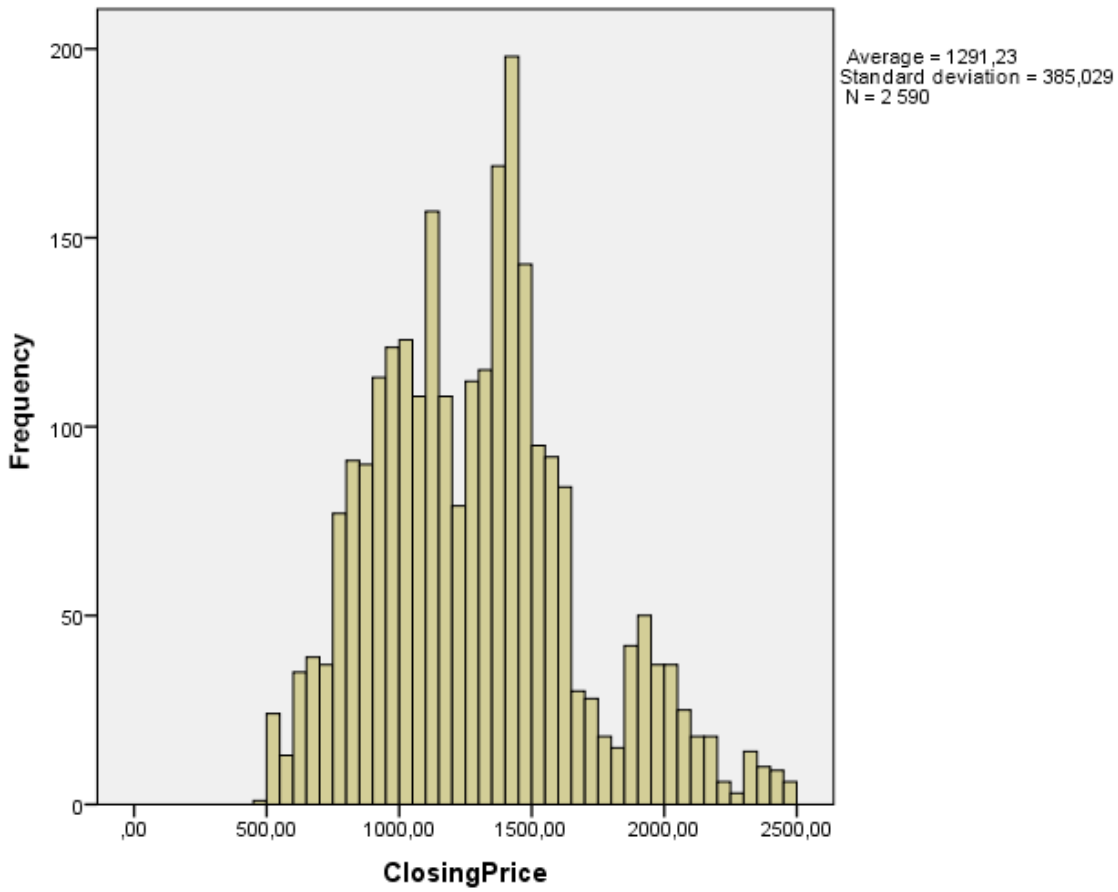


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Examine

Notes

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Processing missing values	Used cases	The statistics are based on observations without missing values for all the dependent variables and factors used.
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Resources	Processor time	00:00:02,25
	Elapsed time	00:00:02,66

Summary Report on observations

	Respondents					
	Acceptable		Missing		Total	
	N	%	N	%	N	%
ClosingPrice	2590	100,0%	0	0,0%	2590	100,0%

Descriptive statistics

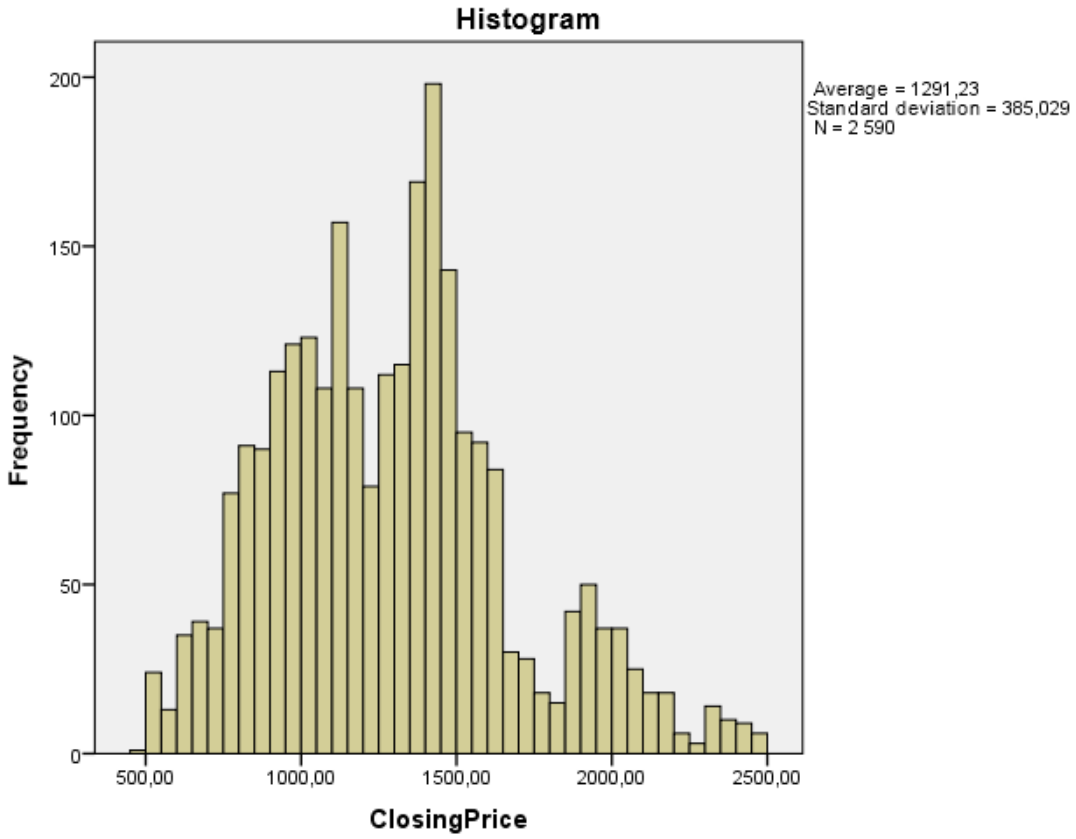
			Statistics	Mean error
ClosingPrice	Average value		1291 .2337	7 .56561
	95% confidence interval for the average	Lower limit	1276 .3984	
		Upper limit	1306 .0689	
	Average for the sample, truncated by 5%		1277 .9499	
	Median		1285 .4700	
	Dispersion		148247 .674	
	Standard deviation		385 .02945	
	Minimum		498 .20	
	Maximum		2487 .92	
	Range		1989 .72	
	Interquartile range		493 .05	
	Asymmetry		.508	.048
	Kurtosis		.070	.096

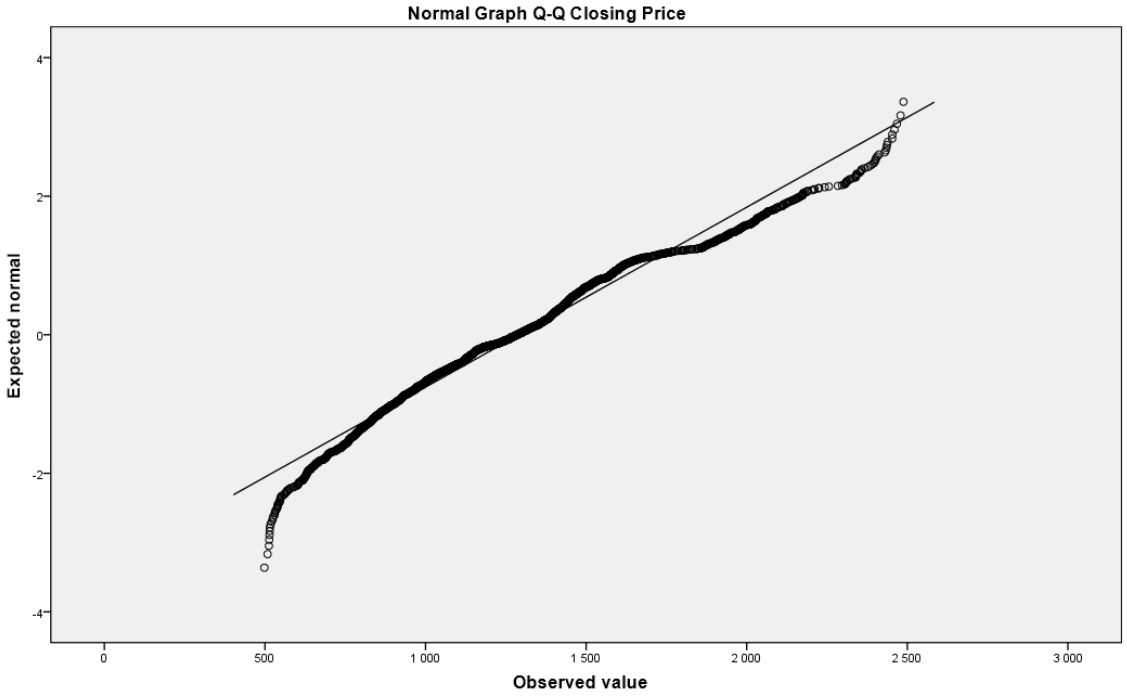
Criteria for normal distribution

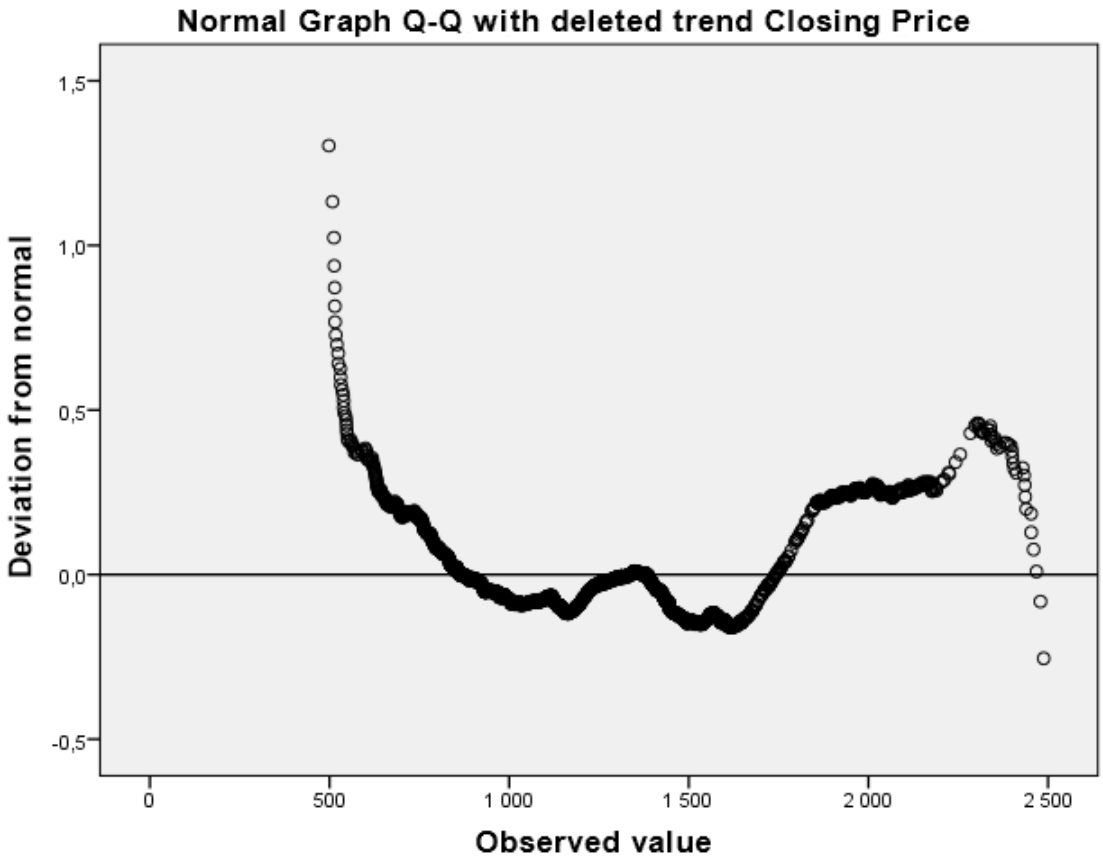
	Kolmogorov–Smirnov test[a]			**Shapiro–Wilk test**		
	Statistics	df.	Statistics	Statistics	df.	Significance
ClosingPrice	,049	2590	,000	,977	2590	,000

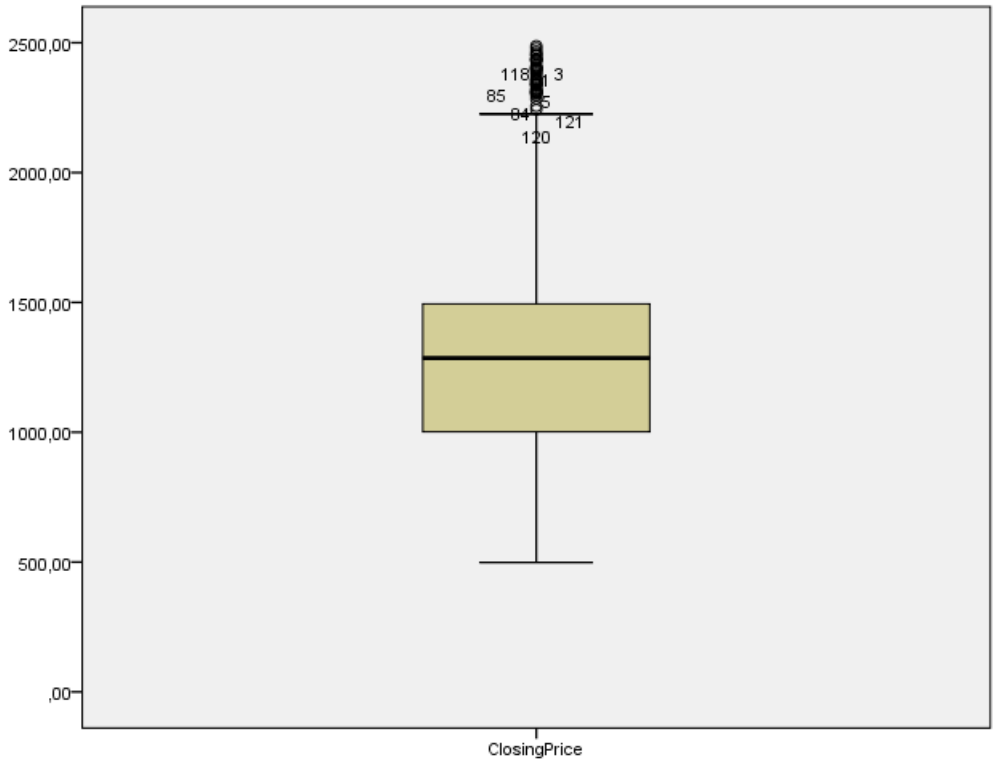
a. Lilliefors test

ClosingPrice









SORT CASES BY ClosingPrice.

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SPLIT FILE SEPARATE BY ClosingPrice.
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 /MISSING ANALYSIS.
```

REVISTA INCLUSIONES M.R.
REVISTA DE HUMANIDADES Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA EDITORIAL