

Analysis of Financial Stability of the Insurance Market in Novosibirsk Region

Mikhail K. Chernyakov^a, Olesya V. Usacheva^b and Natalia I. Aksenova^c
Novosibirsk State Technical University, Novosibirsk, Russia

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Abstract: The current state of the insurance market is characterized by a high degree of instability. The financial stability of insurance companies is influenced by a large number of factors, such as the number of contracts, payout ratio, capital structure, profitability and underwriting risk. The insurance industry acts as a protective barrier for the country's economy from the effects of various risks, at the same time, the financial stability of insurance companies is also subject to the influence of risks. The volume of scientific publications indicates the presence of a steady interest in this problem. However, there is no methodology to establish the relationship between financial stability and multiple factors influencing it. Our research is aimed at identifying links and determining the influence of factors on the financial stability of insurance companies. We assumed that the factors that change the financial stability of the insurance market can be identified and assessed using a forward-looking analysis of the paradoxical theory of regulation. Based on this analysis, a regression model was formed for the insurance market of the Novosibirsk region, which can form the basis for predicting the financial stability of insurance companies.

1 INTRODUCTION

Insurance is a significant part of the country's financial and credit mechanism, and sustainable development of this segment contributes to the development of the economy as a whole and allows to raise the level of financial activity of the population and the level of its social protection. The most important strategic task is to comprehensively promote the development of the insurance industry and make it a strategically important Russian economy sector. Regional insurance markets represent integral elements of the national insurance market. Even in the Strategy of development of insurance activity in the Russian Federation until 2020, the expansion of regional programs for the development of certain types of insurance was specified as a measure to ensure sustainable development of the voluntary insurance sphere. Ensuring sustainable development of regional insurance markets is a primary task in ensuring the development of the insurance industry as a whole.

The insurance market's financial stability is its main fundamental value since the insurer's ability to timely and fully fulfill its obligations is significant for all market participants, from the insurer to the insurance supervisory authorities. As noted by Konstantinova E. A., Trezorova O. Yu. as a factor creating the relationship between economic entities and insurance companies, scientists consider the maintenance of financial stability of the insurance organization within the given limits (Konstantinova and Trezorova, 2016). Problems of estimation of insurance organizations financial stability cause steady both scientific and practical interest. In doing so, scholars reveal different relationships between industry regulation and insurers' financial stability (Gavira-Durón et al., 2020), between capital structure and financial stability (Rubio-Misas, 2020), between financial stability and risk (Moreno et al., 2020), between risk and digitalization (Bryzgalov et al., 2020), between capital and risk (Dacorogna, 2018), etc.

^a  <https://orcid.org/0000-0002-9837-4849>

^b  <https://orcid.org/0000-0002-2625-8988>

^c  <https://orcid.org/0000-0001-7487-9722>

Thus, Rubio-Misas, M. investigated the effect of ownership concentration on risk taking by insurance companies using Z-score as a validity criterion and applying a two-step GMM framework. His study results showed that insurers with a more concentrated ownership structure tend to have lower levels of financial stability (Rubio-Misas, 2020).

A study of the performance of Spanish insurance companies during the economic crisis, based on a dynamic panel data model, made it possible to establish a direct relationship between actual solvency margins and profitability, underwriting risk and an inverse relationship with size, use of reinsurance, long-term business and life insurance specialization. Lower insurance market concentration also leads to lower solvency margins (Moreno et al., 2020).

The link between profitability and financial stability of insurance companies is also discussed in the article by scientists from Kazakhstan. They investigated the profitability of insurance companies by constructing an econometric linear multivariate regression model and proved that it is influenced by three indicators, firm size (its assets), fixed production assets, and financial leverage and substantiated the possibility of using these indicators further to predict the profitability and financial stability of insurance companies. Debt-to-asset ratio characterizes the extent to which the company fulfills its current obligations, so the paper focuses on the need for adequate reflection of liabilities in the financial statements as the main source of information for interested users (Kulustayeva et al., 2020).

Insurance companies are the primary means of protecting the country's economy from various risks while being affected by risks that reduce their financial sustainability. Financial globalization has led to an accelerated growth of financial flows, which has influenced the state and further the development of the insurance sector of the economy. The security of the insurance sector depends on the economic security of the country as a whole. Palestinian researchers see the need to study insurance companies' financial conditions and identify the key factors affecting their solvency and establish a close relationship between them (Abdel and Ayyash, 2019).

The global trend shows an increase in systemic risk due to insurance companies' sensitivity to changes in interest rates (increasing aggregate risk) and increased cyber threats (Gómez et al., 2018). The digitalization of the insurance market creates new opportunities for market participants, but on the other hand, it also creates additional risks, such as

cyberattacks. The insurance market's financial stability is also affected by high competition from the banking sector, which offers insurance services along with purely banking products. In doing so, banks adapt their products to the trends and dynamics that characterize the global insurance industry (Marzai, 2018). Another factor affecting the insurance industry and carrying risk is the decline in purchasing power, as most insurance products are designed for the mass consumer. Nesterenko E.V. talks about the interrelation of risks and financial stability of an insurance company. In particular, it points to the existence of two types of risks in the insurance sphere: risks arising directly from the activities of the insurance organization as an object of economic activity, as well as risks transferred from the insured (Nesterenko, 2018). Some authors consider the presence of losses as a factor affecting insurance companies' financial stability, which represents an integral element of economic security in the insurance sector (Pavlova et al., 2017). They consider the necessity of risk assessment when accepting a facility for insurance as an unconditional priority.

Eling, M. et al investigate the possibility of using artificial intelligence by insurance companies to improve the quality of loss probability prediction and reduce asymmetric information. Researchers note that artificial intelligence can significantly change the risk landscape by transforming risks, requiring insurance companies to rethink traditional insurance coverage and develop adequate insurance products (Eling et al., 2021).

Russian scientist D.V. Bryzgalov and his colleagues devoted their research to the consideration of transformational processes taking place in the insurance market under conditions of digitalization of the economy in the context of insurance theory. The authors identified two indicators to assess the insurance market's digitalization (the coefficient of use of new digital technologies and the level of penetration (digitalization)). They found heterogeneity in the use of digital technologies across different insurer business processes: from the maximum in the organization of sales of insurance services to the minimum in the risk management of insurance companies themselves (Bryzgalov et al., 2020).

The problems of efficiency evaluation of insurance organizations are studied by the Swiss scientist Michel Dacorogna. In particular, he points to the inadequacy of existing performance indicators to current trends in global insurance development and notes a gradual shift towards introducing such indicators as risk-adjusted return on equity, which

allows assessing the proportionality of profits earned on a particular insurance contract to the risks incurred. Central to this is the concept of risk capital and the need to manage it in maintaining the solvency of insurance operations (Dacorogna, 2018).

The current state of the Russian insurance market is characterized as unstable, as evidenced by low demand for insurance services: the share of insurance premiums in domestic GDP is 1.4%, which is more than 4 times lower than the global average. The ratio of claims paid to premiums paid in 2019 was 41.4%, i.e., for every ruble paid, the consumer receives 41 kopecks. The slowdown in the insurance market's development is due to the lack of in-demand insurance products and their low attractiveness for consumers (Sukhorukova et al., 2016).

Thus, we can state the undoubted interest of researchers from different countries to assess financial stability in the insurance sector. We will try to identify the parameters affecting financial sustainability and establish the presence or absence of relationships between them. As we see it, the research results will be interesting both for insurance market regulators and its main subjects: policyholders and insurers, as well as scientists researching this and related scientific fields.

2 RESEARCH METHODS

The research is performed using the prospective analysis of the paradoxical theory of regulation proposed by M.M. Chernyakova and tested on the dairy industry's example (Chernyakova, 2019).

3 RESULTS OF RESEARCH

As a regional insurance market, the insurance market of Novosibirsk region (NSR) was investigated in the context of factors influencing its financial sustainability. The peculiarities of the insurance market infrastructure in the NSR have been identified, which consists of the prevalence of branches of federal-level insurance companies in the market. While only three regional insurers (registered in NSR) are active, providing a share of 6.15% of the total premiums collected in NSR in 2019. One insurer specializes in compulsory health insurance. The other two, one of which is a mutual insurance company, specialize in insuring means of land transport (except for railway transport).

The Novosibirsk Region ranks 8th among Russian regions (Table 1) and 1st in the Siberian Federal District (Figure 1).

Table 1: Top 10 constituent entities of the Russian Federation in terms of premiums collected in 2019.

Region	Volume of insurance premiums, RUB bln	Number of contracts, million	Volume of premiums/contract, thousand roubles
Moscow	727.6	100.4	7.2
St. Petersburg	123.8	8.6	14.4
Moscow region	58.9	6.2	9.5
Republic of Tatarstan	27.9	3.6	7.8
Krasnodar Territory	26.9	3.9	6.9
Sverdlovsk region	26.8	4.2	6.4
Samara region	25.1	2.8	9.0
Republic of Bashkortostan	18.9	2.5	7.6
Chelyabinsk region	18.3	3.2	5.7
Novosibirsk region	17.9	2.8	6.4

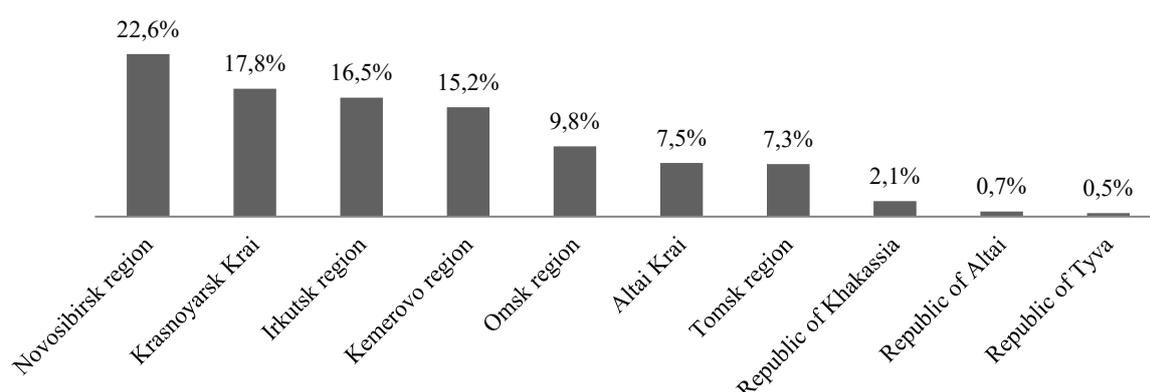


Figure 1: Insurance payments in 2019 by regions of the Siberian Federal District (as % of total).

Nearly 50% of the NSR insurance market in terms of premiums collected in 2019 is held by 3 financial groups:

1. 20% - SOGAZ Group - RUB 3.6 billion (SOGAZ, SOGAZ-Life, VTB Insurance, VTB Life Insurance)
2. 14% - "Sberbank insurance" - RUB 2,6 billion ("Sberbank Insurance", "Sberbank Life Insurance")
3. 13% - Alfastrakhovanie Group - RUB 2.4 billion ("Alfastrakhovanie", "Alfastrakhovanie - life").

In 2019, 82 companies were active in the insurance market of the Novosibirsk region (3 companies more than in 2018). In 2019, 9 new insurance companies entered the regional market and 6 left the market. The new companies' main product directions in the market are life insurance, travel insurance, voluntary medical insurance, and property insurance of enterprises and individuals.

The Novosibirsk Region's voluntary and compulsory insurance market, excluding OMI, amounted to RUB 17.8 billion (+13.3%) in 2019. The voluntary insurance segment (life insurance, personal insurance, property insurance) accounted for RUB 13.5 billion or 76%, and the compulsory insurance segment (MTPL, hazardous facility liability insurance, carrier liability insurance) accounted for 24%. As the key drivers of 2019 in the Novosibirsk region market participants note - growth of premiums in OSAGO, CASCO - insurance of legal entities, in personal insurance high dynamics in accident and illness insurance, in particular in bank insurance; insurance of property of legal entities - cargoes, means of air transport, insurance of business and financial risks.

In the voluntary insurance market in the Novosibirsk region in 2019, life insurance and pension insurance amounted to RUB 6.03 billion,

which corresponds to 44.6% of the market (+8.2% compared to 2018). Life insurance (99%) makes the main contribution to the formation of insurance premiums in this segment of the insurance market.

Property insurance segment in the voluntary insurance market in Novosibirsk region increased by 26.4% compared to 2018 and took 31% (RUB 4.2 billion) by the end of 2019. 85% of the property insurance segment accounts for property insurance (of which RUB 1.4 billion are premiums under hull insurance contracts) and 15% for voluntary civil liability insurance.

Personal insurance reached 24.3% (RUB 3.2 billion) of the voluntary insurance market in the Novosibirsk region in 2019 (+18.7% vs. 2018). Accident insurance accounts for 71% (+33.4% vs. 2018 or RUB 2.3 billion). The remaining share is accounted for by AMI (-6.6% vs. 2018).

In the compulsory insurance market in the Novosibirsk region, OSAGO is the leader - 98.4% (+6% vs. 2018) out of 4.4 billion rubles.

The payout rate in Novosibirsk region in terms of insurance premiums in 2019 was 44% (+5%) or RUB 7.8 billion in absolute values (+25%). In life insurance, the level of payments from the collected insurance premiums amounted to 39% or 2.3 billion rubles (+74%). The level of payments under CASCO is 57%. Accident insurance - 12%. The level of OSAGO insurance payouts in 2019 was 80%.

The Novosibirsk Region ranks 10th after federal cities and 7 regions in terms of premiums collected in 2019 (Table 1). A total of 2.8 million insurance contracts were concluded; each contract amounted to an average of 6.5 thousand rubles. For comparison, among the top 15 regions of the country in terms of premiums collected, the highest indicator of premiums collected to the number of contracts is in

St. Petersburg - 14.4 thousand rubles, the lowest one - in the Rostov region.

The market of insurance services is dominated by organizations registered in other regions and only 3 organizations and two branches - in NSO (Gorshkova, 2020). The insurance companies of the

Novosibirsk region almost completely provide services of voluntary insurance only (Tab. 2). The insurance fund financial strength ratio was calculated using the formula:

$$X19=(X2+X8+X12+X17)/(X3+X18) \quad (1)$$

Table 2: Activities of insurers - legal entities registered in the Novosibirsk Region in 2015-2019.

X1	Time period, year	2015	2016	2017	2018	2019
X2	Insurance premiums by insurance types, RUB bln	0.885	0.509	0.691	0.772	0.917
X3	Insurance payments by types of insurance, RUB bln	0.303	0.088	0.044	0.036	0.030
X4	Insurance proceeds, RUB bln	0.582	0.421	0.647	0.736	0.887
X5	Number of contracts concluded by type of insurance, mln. units	0.306	0.179	0.229	0.209	0.437
X6	Sum insured under the concluded contracts by types of insurance, RUB bln	93.724	70.255	67.485	56.362	93.426
X7	Payout ratio by insurance types, %	36.300	18.000	6.500	4.700	3.300
X8	Investment income, RUB bln	1.285	0.048	0.427	1.306	0.339
X9	Share capital, RUB bln	0.969	0.638	0.657	0.657	0.657
X10	Net profit (loss "-"), RUB bln	0.137	0.023	0.064	0.0002	0.158
X11	Equity capital, RUB bln	1.107	0.661	0.720	0.657	0.814
X12	Insurance reserves, RUB bln	1.625	0.271	0.708	0.796	0.916
X13	Leverage	1.468	0.410	0.983	1.212	1.125
X14	Accounts receivable (end of period), RUB bln	0.948	0.769	0.810	0.840	0.901
X15	Accounts payable (end of period), RUB bln	0.242	0.045	0.753	0.847	0.888
X16	Ratio of AR to AP	3.920	17.012	1.076	0.992	1.014
X17	Other income from insurance activities, RUB bln	3.502	0.00317	0.00592	0.00034	0.000
X18	Case Management Costs (CMC), RUB bln	5.693	5.693	0.562	0.659	0.744
X19	Insurance fund financial strength ratio	1.214	0.144	3020	4.137	2.804

According to the data presented in the table, insurance payouts and business expenses of insurers tended to decrease during the period under review, which was reflected in an increase in the insurance fund financial sustainability ratio. One of the factors affecting insurers' financial stability is the payout ratio (X7), the decrease of which in the specified period was also contributed by the decrease in the amounts of insurance payouts by insurance types. Since 2017, there has been a significant decrease in the accounts receivable (AR) to accounts payable (AP) ratio. Based on the fact that the value of the insurance company's AR should roughly correspond to the value of its AP, we regard this trend as positive. An excess of AR over AP, as was the case in 2017, may have as negative consequences the insurance

company's failure to meet regulatory requirements for the placement of its insurance reserves, which will result, accordingly, in a lower investment income and reduced financial stability. This dependence is confirmed by the data in Table 2 (X8 and X19). There is also a trend of rapid growth in the profitability of NSO insurance organizations, due to an increase in insurance premiums (on average 10% annually) and a 10-fold decrease in insurance payouts in 2019 relative to 2015. These results were achieved by changing the proportions of personal and property insurance - growth of personal and reduction of property insurance (Fig. 2). It is worth noting that the growth in insurance premiums occurred against the backdrop of a decline in the number of insurers from five to three in 2016.

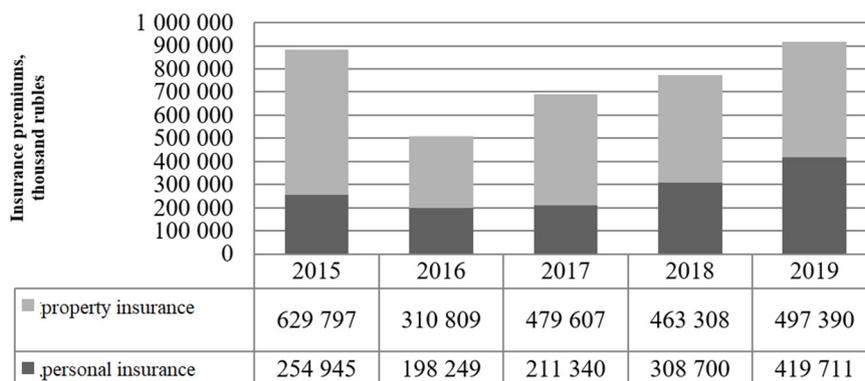


Figure 2: Changes in the structure of voluntary insurance.

The sharp decline in property insurance in 2016 (fig. 2) is associated with the exclusion of high-risk agricultural insurance from the list of services of insurers - legal entities registered in the Novosibirsk Oblast (fig. 3) (Gorshkova, 2020). This was a consequence of an erroneous management decision to include state support for agricultural insurance in the

"single subsidy". The resulting management risk led to an increase in psychological risk, which led to the mass abandonment of insurance by economic entities of the agricultural sector (Chernyakov and Chernyakova, 2021), (Chernyakov and Chernyakova, 2019).

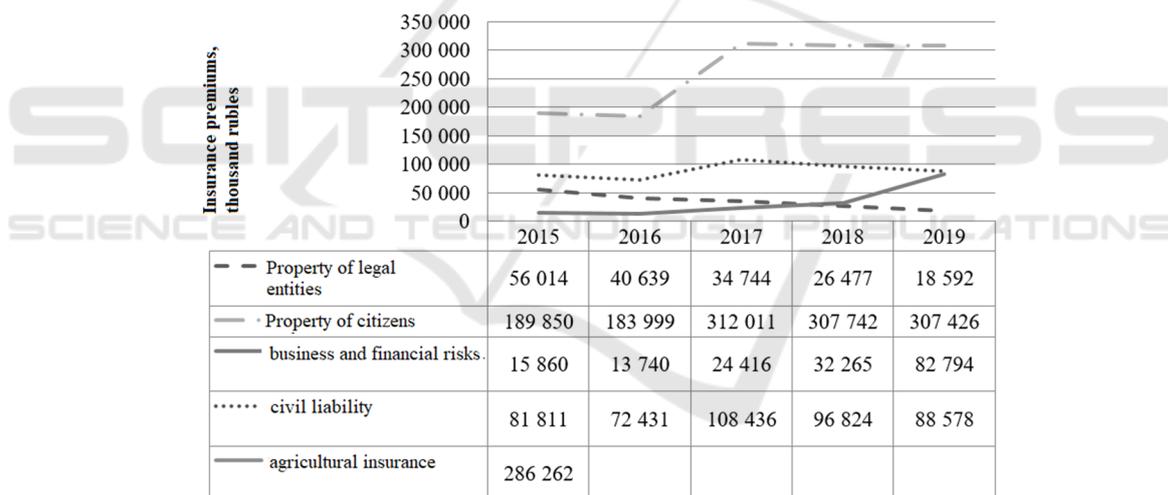


Figure 3: Change in the structure of voluntary insurance by individual types of insurance.

The correlation analysis of the table 2 shows the possible direct close to linear relationship ($R > 0,7$) of time period (X1) with 8 of 18 insurance market parameters (table 3): insurance payments (X3), earnings (X4), payout ratio (X7), authorized capital (X9), accounts payable (X15), other income from insurance activities (X17), costs of doing business (X18) and insurance fund financial stability

coefficient (X19). According to the paradoxical theory of regulation (Chernyakova, 2019), other parameters can be related to the time period only indirectly, through parameters of direct influence.

Table 3: Correlation analysis of insurers - legal entities registered in the Novosibirsk region in 2015-2019.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19
X1	1.0	0.3	-0.8	0.8	0.4	-0.1	-0.9	-0.2	-0.7	0.0	-0.5	-0.3	0.0	-0.1	0.9	-0.5	-0.7	-0.9	0.7
X2	0.3	1.0	0.3	0.8	0.8	0.6	0.1	0.5	0.5	0.7	0.6	0.8	0.9	0.9	0.5	-0.8	0.4	-0.3	0.4
X3	-0.8	0.3	1.0	-0.4	0.1	0.5	1.0	0.5	1.0	0.4	0.9	0.8	0.4	0.6	-0.6	0.1	1.0	0.8	-0.5
X4	0.8	0.8	-0.4	1.0	0.7	0.2	-0.6	0.2	-0.2	0.4	0.0	0.3	0.5	0.5	0.9	-0.8	-0.2	-0.8	0.8
X5	0.4	0.8	0.1	0.7	1.0	0.8	-0.1	0.0	0.2	0.9	0.5	0.5	0.5	0.7	0.4	-0.5	0.2	-0.2	0.2
X6	-0.1	0.6	0.5	0.2	0.8	1.0	0.5	0.0	0.6	1.0	0.8	0.6	0.4	0.8	-0.2	-0.1	0.6	0.3	-0.4
X7	-0.9	0.1	1.0	-0.6	-0.1	0.5	1.0	0.3	0.9	0.3	0.8	0.6	0.2	0.4	-0.8	0.3	0.9	0.9	-0.7
X8	-0.2	0.5	0.5	0.2	0.0	0.0	0.3	1.0	0.6	0.0	0.5	0.7	0.8	0.6	0.2	-0.5	0.6	0.0	0.4
X9	-0.7	0.5	1.0	-0.2	0.2	0.6	0.9	0.6	1.0	0.5	0.9	0.9	0.7	0.8	-0.4	-0.1	1.0	0.6	-0.3
X10	0.0	0.7	0.4	0.4	0.9	1.0	0.3	0.0	0.5	1.0	0.8	0.7	0.5	0.8	0.1	-0.4	0.5	0.1	-0.1
X11	-0.5	0.6	0.9	0.0	0.5	0.8	0.8	0.5	0.9	0.8	1.0	0.9	0.7	0.9	-0.3	-0.2	0.9	0.5	-0.3
X12	-0.3	0.8	0.8	0.3	0.5	0.6	0.6	0.7	0.9	0.7	0.9	1.0	0.9	0.9	0.0	-0.5	0.9	0.2	0.1
X13	0.0	0.9	0.4	0.5	0.5	0.4	0.2	0.8	0.7	0.5	0.7	0.9	1.0	0.9	0.4	-0.8	0.6	-0.2	0.5
X14	-0.1	0.9	0.6	0.5	0.7	0.8	0.4	0.6	0.8	0.8	0.9	0.9	0.9	1.0	0.2	-0.5	0.7	0.1	0.1
X15	0.9	0.5	-0.6	0.9	0.4	-0.2	-0.8	0.2	-0.4	0.1	-0.3	0.0	0.4	0.2	1.0	-0.8	-0.5	-1.0	0.9
X16	-0.5	-0.8	0.1	-0.8	-0.5	-0.1	0.3	-0.5	-0.1	-0.4	-0.2	-0.5	-0.8	-0.5	-0.8	1.0	-0.1	0.7	-0.8
X17	-0.7	0.4	1.0	-0.2	0.2	0.6	0.9	0.6	1.0	0.5	0.9	0.9	0.6	0.7	-0.5	-0.1	1.0	0.6	-0.4
X18	-0.9	-0.3	0.8	-0.8	-0.2	0.3	0.9	0.0	0.6	0.1	0.5	0.2	-0.2	0.1	-1.0	0.7	0.6	1.0	-0.9
X19	0.7	0.4	-0.5	0.8	0.2	-0.4	-0.7	0.4	-0.3	-0.1	-0.3	0.1	0.5	0.1	0.9	-0.8	-0.4	-0.9	1.0

Table 2 shows that income (X4) has a direct relationship ($R > 0.7$) with insurance premiums (X2) and the number of concluded contracts (X5), while the latter is directly related ($R > 0.8$) to the sum insured on concluded contracts (X6) and net profit (X10).

Table 2 also shows that statutory capital (X9) has a direct relationship ($R > 0.7$) with equity (X11), insurance reserves (X12), leverage (X13), and accounts receivable (X14), while the penultimate is directly related ($R > 0.8$) to investment income (X8).

Given the existing system of relationships according to the paradoxical theory of regulation (Chernyakova, 2019), a regression model can be built. The algorithm of such a three-level model is shown in Figure 4.

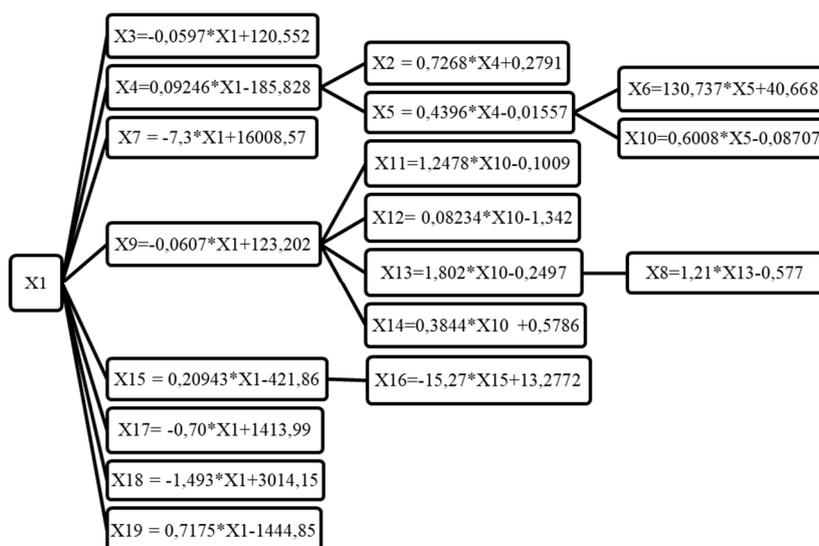


Figure 4: Algorithm of the mathematical model of the insurance market in the Novosibirsk Region.

4 RESULTS AND DISCUSSION

The correlation analysis showed that the closest directly proportional relationship, which is close to functional, exists between the financial stability coefficient of the insurance fund and the amount of accounts payable (X15, correlation coefficient R = 0.9) as well as the amount of income from insurance (X4, correlation coefficient R = 0.8). Close inverse correlation was revealed between the insurance fund financial stability coefficient and the cost of doing business (X18, R = - 0.9), and the RS/CA ratio (X16, R = - 0.8). Also, an inversely proportional dependence was revealed between financial stability and payout ratio by types of insurance (X7, R = - 0.7). This means that a decrease in the share of insurance claims has a positive impact on financial stability. This finding is consistent with the results of the study (Komen, 2012), but contrary to the research (Abdel Jawad, 2019). The value of the correlation coefficient below 0.7 suggests that there is no close relationship between the performance indicator and the parameters. We found that there is no explicit relationship between insurance fund financial strength and leverage (X13, R = 0.5) and return on investment (X8, R = 0.4). At the same time, we allow for the possibility of indirect influence of these factors on financial stability.

Second-order factors were identified, through which it is possible to influence the financial stability of the insurance fund with the help of the first-order factors we established earlier. The highest correlation

is established between the coefficient of payments by insurance types and other income from insurance activities (X17, R = 0.9), as well as costs of insurers' case management (X18, R = 0.9). A linear functional relationship is established between the size of accounts payable and the cost of doing business (R = -1.0), a relationship that is close to a functional one between the size of accounts payable and insurance income (X4, R = 0.9).

The analysis also revealed that there is a close correlation between the time period and the amount of insurance payments, the amount of income and the payout ratio, which is close to a functional relationship (correlation coefficient R >0.7). Moreover, between the period of time and the amount of insurance payments (R = - 0.82), as well as the payout ratio (R = - 0.90) the dependence is inversely proportional, i.e. with growth of the period of time the values of these indicators will decrease. There is no linear dependence between the period of time and such factors as: insurance premiums, number of concluded contracts by insurance types and sum insured (the relation is weak, R is less than 0.5). We assume that we cannot abstract from the influence of the last named factors, as they affect the time period indirectly through those parameters with which a high correlation is established. We also found a high relationship between the income indicator and premiums (R = 0.77) and the number of contracts signed (R = 0.74) and between the number of contracts signed and the sum insured (R = 0.81). The established relationships made it possible to form a

regression model for insurance companies of the Novosibirsk region.

The obtained results confirm our hypothesis and allow us to speak about the existing dependence between the financial indicators characterizing the activities of insurance companies and affecting their financial stability.

5 CONCLUSION

The article reveals a comprehensive systematic approach to assessing the impact of factors on insurance companies' financial stability on the example of economic entities of the Novosibirsk region.

The research results indicate the presence of common patterns and correlations between the indicators characterizing the activities of insurance companies and the financial stability of insurers. The conducted analysis allows us to state that there are direct and inverse proportional relationships between certain financial indicators. Simultaneously, the lack of correlation does not reject the fact of influence on the financial stability of insurance organizations. We concede that this influence is manifested indirectly through other parameters.

This, in turn, indicates the possibility of managing financial stability for given parameters based on a mathematical model in the form of a system of regression equations.

The research contributes to the development of theoretical approaches to assessing insurance companies' financial stability based on paradoxical regulatory theory. The research's practical value lies in the possibility of using the proposed approach to assess and forecast financial stability taking into account various parameters.

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