

Sustainable Economy Instruments: Modeling the Insurance Market

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ABSTRACT

The balanced development of the insurance market, based on modeling and forecasting, is an important factor in ensuring sustainable socio-economic development of the regional or national economy, a tool for social stability and protection of the population. The authors undertake an attempt to develop models for predicting the main indicators of the insurance market in conjunction with the key indicators of a sustainable economy. The purpose of the study is to develop and substantiate the forecast of the main trends in the development of insurance as a factor in a sustainable economy, based on modeling its key indicators. The forecast values of indicators characterizing the development of the insurance market in the Russian Federation are obtained. The developed forecasting models of the main indicators of the insurance market can be used in the work of government bodies and insurance companies. The use of the proposed models enables us to develop a new strategy for the development of the insurance market, which will meet the interests of not only insurance companies, but also policyholders, ensuring sustainable development.

Keywords: *Sustainable Development, Sustainable Economy, Insurance, Insurance Market Modeling, Sustainable Development Indicators.*

1. INTRODUCTION

The main factors of a sustainable development according to the UN methodology are balanced and safe socio-economic and territorial-spatial well-being and social development, the formation of a competitive economy based on the institutional economic freedom [1, 2]. A systematic problem-solution is possible only if the development is ensured on the basis of a protected and secured institutional environment of the economic society system. Insurance, as one of the forms of protecting property interests, provides such a security, contributing to the strengthening of social stability of the population. The development of insurance is of particular relevance in the context of the coronavirus pandemic, which has radically changed the economic agenda, putting measures to support and stabilize economic agents in the first place [3]. At the same time, in the context of a coronary crisis trigger of contradictions, it is important to ensure the development of financial mechanisms for sustainable development.

Studies in the field of new industrialization, national and regional programming and conceptual strategic territorial-sectoral development are analyzed in the works of S. D. Bodrunov [4, 8], E. G. Animitsa,

Ya. P. Silin [5, 6, 7], R. S. Grinberg, D. E. Sorokin [8], S. Yu. Glaziev [9], A. N. Zubets [10], G. A. Smirnova [11], N. M. Surnina [12], A. A. Ilyukhin [12] and the others. Among others, these papers also consider the regulation issues and insurance modeling. Despite a large number of scientific publications devoted to the topic of insurance, the issues of methodology and practice of forecasting the development of the insurance market are insufficiently covered in the special literature.

In Russia, the insurance is presented in two forms: compulsory and voluntary, and if the first form is implemented exclusively by virtue of the law, then the second one is developed alongside with the growth of the population well-being (individuals and legal entities), therefore, the definition of the regulated factors affecting the insurance market would enable not only to predict the development trends of this industry, but also to outline ways of optimizing the activities of the insurance companies, both in terms of expanding the services volume and in terms of providing better satisfaction of the population's demand in the insurance products.

The penetration depth of the insurance market is one of the evidences of the sustainability of the socio-

economic development of both the country as a whole and individual territories, since insurers, in essence, are financial agents serving, together with the banking structures and other financial and credit institutions, the property interests of the insured and insured persons. The wider range of services insurers can offer, the larger the sphere of vital interests of the population and business can be protected. The development of insurance, first of all, ensures a consistently positive social and economic well-being of a significant part of citizens. The purpose of the study is to model key indicators, develop and substantiate the forecast of the main trends in the development of the insurance market in the Russian Federation, as a factor of the sustainable development.

2. MATERIALS AND METHODS:

2.1. Correlation and Regression Analysis of Insurance Market Development

The methodological basis of the work was the fundamental systemic papers on the insurance market by Yu. A. Spletukhova [14], A. N. Yurgens [15], A. N. Zubets [10], etc. as well as the legislative and the regulatory acts of the Russian Federation, statistical data in the field of economics, demography, labor market.

The indicators of the insurance market are closely interdependent and determined by the dynamics of the socio-economic development of a society. First of all, this is the size of the population and - since we are talking about the characteristics of the life quality - the income of the population. Using the official statistical data for the period 2005-2019, it is possible to analyze the ratio of changes in these indicators with the dynamics of the main indicators of the insurance company activities for the specified period. Figure 1 demonstrates the dynamics of the indicated values for 2005-2019. When displaying graphs and conducting further analysis, the data for 2014 is taken into account in the Russian Federation without the Crimean Peninsula territories.

The hypothesis we are testing consists of the existence assumption of the relationships between the main indicators of socio-economic development, which generally characterize the living standard of the population as well as indicators describing the development of the insurance market in Russia.

In the context of our research, we aim at considering reasonably the following socio-economic indicators: (1) population size (estimate at the end of the year; thousand people); (2) real incomes of the population (rubles); (3) average per capita monetary income of the population (rubles); (4) average monthly nominal accrued wages of employees of organizations (rubles); (5) average size of assigned pensions (rubles); (6) number of pensioners (thousand people); (7) share of

pensioners in the total population (%); (8) the number of pensioners per 1000 people of the population (people); (9) the number of employed per one pensioner (people, on average per year); (10) inflation rates (in% to the previous year); (11) the Bank of Russia key rate (weighted average, %); (12) labor productivity - growth rates (% to the previous year); (13) share of employed persons in the total population aged 15-72 (%); (14) the unemployment rate of the population aged 15-72 years (%); (15) inequality in income distribution (P90/P10); (16) government spending on social policy (% of GDP); (17) health care expenditures not funded by personal household expenditures (%).

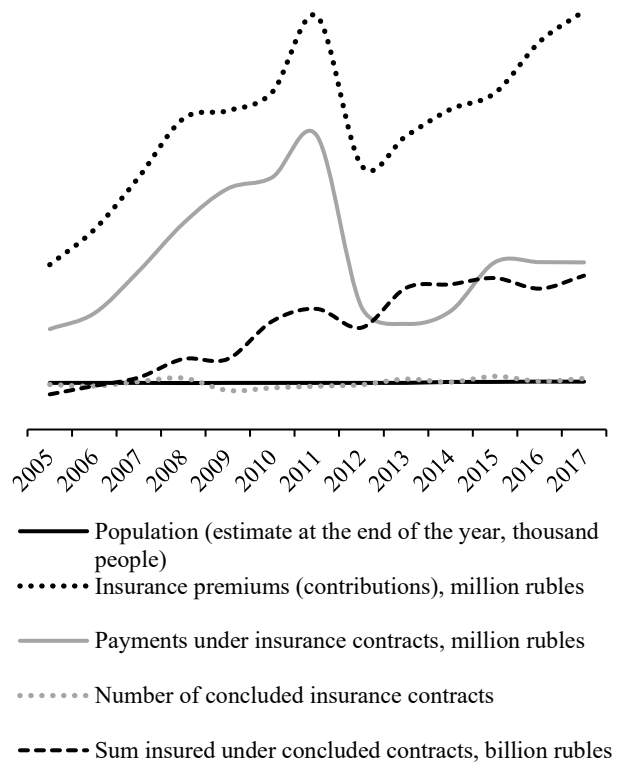


Figure 1 Change in the population and performance indicators of insurance companies for the period 2005-2021.

Among the indicators of the insurance market we also take into account the following issues: (18) the number of registered insurance organizations (units); (19) the number of their branches (units); financial indicators in million rubles: (20) authorized capital; (21) insurance premiums (contributions); (22) insurance premiums under voluntary insurance contracts; (23) insurance premiums under voluntary insurance contracts concluded with individuals; (24) insurance premiums under compulsory insurance contracts; (25) payments under insurance contracts; (26) payments under voluntary insurance contracts; (27) payments under voluntary insurance contracts concluded with individuals; (28) payments under compulsory insurance

contracts; (29) number of concluded insurance contracts (million); (30) number of concluded voluntary insurance contracts (million); (31) number of compulsory insurance contracts concluded (million); (32) balanced financial result (profit minus loss); (33) sum insured under concluded contracts (billion rubles).

3. RESULTS AND DISCUSSION

Correlation-regression analysis of the selected indicators revealed the following data: 93 pairs of indicators (34.2%) demonstrate a close relationship out of 272 possible correlations. If we also take into account the connections, where the modulus correlation coefficient has a value greater than 0.6, i.e. the closeness of the relationship approaches a strong one, then the percentage of a fairly close correlation will be 44.5 (121 coefficients out of 272). At the same time, the largest number of close ties is observed for the indicators, referring to the number of accounting insurance organizations, authorized capital, insurance premiums under voluntary insurance contracts. Among the socio-economic indicators, the largest number of close correlations is observed for the number of pensioners.

However, a substantive analysis of the obtained relationships makes it possible to doubt the truth of the found close relationships, since in this case the statistical data are time series of indicators taken for the same period: from 2005 to 2019. In this regard, a situation is possible when the influence of the trend component distorts real dependencies, causing the appearance of a connection in cases where it is absent.

To neutralize the extraneous influences on the picture of the real interdependencies, the trend component was excluded for all the indicators under consideration, since the regression analysis, carried out for each of them, in most cases, confirmed the relationship between the indicators and the time period. In the course of further research, all the data used are calculated - taking into account the removal of the trend component.

Taking into account the econometric results and postulates of the economic theory, it should be noted that some of the results obtained are dubious. For example, the feedback between the number of pensioners per 1,000 people in the population indicator and payments under voluntary insurance contracts concluded with the individuals. Other results, on the contrary, are consistent with the logic of economic development and, most likely, can be used for forecasting. To identify the real working trends at the next stage of the study, a paired regression analysis of all the above mentioned relationships was carried out. As an example of the study implementation at this stage, we can consider one of the most interesting and logical

case, confirmed by the correlation analysis of the relationship: the average per capita monetary income of the population and the sum insured under the concluded contracts. The dynamics of indicators is calculated taking into account the elimination of the trend component for 2005-2021 (Figure 2).

The regression analysis results: $R^2 = 0.707$; $F = 26.554$; significance $F = 0.0003167$; coefficient $a = -743178.563$; significance $a = 0.001^{**}$ (172517.127); coefficient $b = 135.348$; significance $b = 0.0003^{**}$ (26.265); $DW = 2.249$ - there is no autocorrelation at the level $\alpha = 0.05$; according to the Goldfeld-Quandt test $F(S1/S3) = 1.627$ - heteroscedasticity was not revealed; there are no statistical outliers.

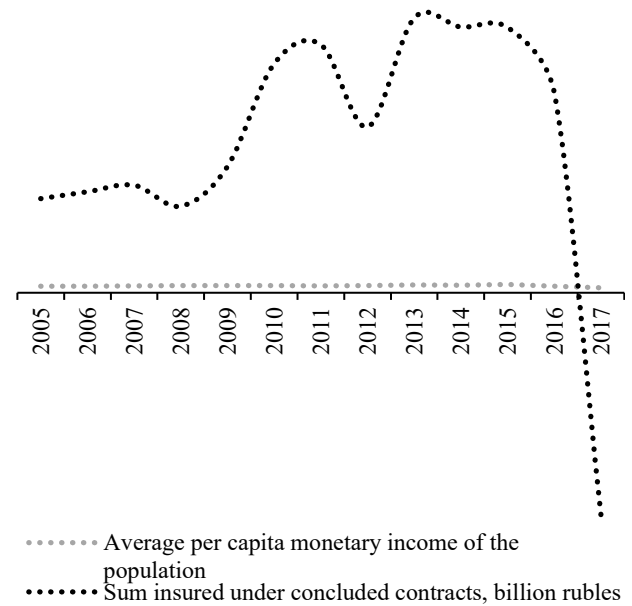


Figure 2 Dynamics of the studied indicators.

Therefore, it is possible to build a regression model that meets the main quality criteria: **Sum insured = $-743178.567 + 135.348 * \text{Average per capita income}$** .

The most important value of such a model embraces the possibility of constructing a reliable forecast based on it, which factually is, in most cases, the ultimate goal of conducting regression studies.

When carrying out these calculations, it was found out that the hypothesis of the autocorrelation absence was not confirmed or rejected for the following pairs of the indicators: 1-18, 3-30, 6-27, 8-31, 13-31, 17-18. However, for all these cases, the hypothesis is rejected at the level $\alpha = 0.01$. As the analysis has shown, only two models are not qualitative from an econometric point of view: they are the links from 8 to 31 (the number of pensioners per 1,000 people of the population - the number of compulsory insurance contracts concluded) and the links from 17 to 31 (health care expenditures financed not at the expense of personal

expenses households - the number of concluded compulsory insurance contracts), the lines corresponding to them are in italics. However, in other cases, the interpretation of the model should be carried out taking into account not only the mathematical, but also the general economic meaning of the indicators: direct forecasting may turn out to be inconsistent with the reality, despite the exclusion of the trend component of the data series used.

4. CONCLUSIONS

1. The economic analysis carried out for the identified trends in the insurance market enables us to explain some of the points that form the impact on the main indicators of this market. So there is an increase in the degree of monopolization of the research object, which, as a result, can lead to an increase in prices for insurance services, and this, in its turn, will lead to a drop in demand for them in the regions.
2. Compulsory health insurance deserves a separate study in the framework of the new challenges. Compulsory health insurance contracts are formed from tax revenues, which, among the other things, depend on the volume of incoming tax payments from the working population, whose number also has a significant impact on this indicator. First of all, the structural disproportion of the variable “number of insurance contracts” is a negative component, except for the actual closed layout of the insurance one. Carrying out operations on compulsory health insurance is an imperative function of the state in terms of fulfilling its social obligations to provide the population with medical care, which means that in further research it will be necessary to pay attention to the medical and demographic indicators of the region and the revenue side of the regional budget.
3. At this stage in Russia, the development of the insurance market depends on two factors that ensure the dynamics of payments: a mandatory form as part of the mortgage insurance and the voluntary one as a part of a social package from the employer as material incentives for the employees. With further research, it seems necessary to study banking statistics and labor statistics in order to provide more complete data analytics.
4. Like all socio-economic objects, the insurance market is viewed as a self-developing system, therefore the developed models for forecasting the main indicators of the insurance market can be used in the work of the government bodies and the insurance companies. The proposed models enables us to develop a new strategy for the development of the insurance market, which will

meet the interests of not only the insurance companies, but also potential policyholders, in cases if there is an effective demand for the insurance products, taking into account the regional peculiarities.

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