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THEORETICAL AND METHODOLOGICAL APPROACH TO ASSESSING THE FINANCIAL STABILITY OF THE SOCIO-ECONOMIC DEVELOPMENT OF TERRITORIAL SYSTEM

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In modern conditions of turbulence of socio-economic development, the study of the financial stability of territorial systems at various levels of government and the search for effective tools for its regulation are becoming relevant. The aim of the study is to develop a methodological approach to assessing the financial stability of the development of territorial systems at the regional and municipal levels of government. To achieve this goal, the following tasks were defined: to identify the features, advantages and disadvantages of applying statistical and economic-mathematical approaches to assessing the financial stability of territorial development at the regional and municipal levels; to develop our own methodological approach. The methodological approach presented in the study involves the systematic use of various methods: statistical indicators (coefficient of variation and standard deviations), reflecting the variability of the dynamics of financial development of the elements of the territorial

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socio-economic system (financial institutions, enterprises of all types of economic activity, households and the public administration sector), maps. According to W. Shewhart charts of financial development indicators, to search for control boundaries beyond which indicates a violation of the financial stability of the system's development, regression modeling to assess influencing factors, ARIMA modeling to predict the most likely and alternative scenarios for the deployment of the dynamics of financial stability of territorial systems in the future. Our methodological approach makes it possible to assess the financial stability of the development of all elements of the territorial socio-economic system, as well as to identify its most vulnerable elements, the stability of which is under threat, and in the future to choose more effective mechanisms for stabilizing the financial development of territorial systems at the regional and municipal levels.

Financial stability, financial sustainability, territorial socio-economic systems, statistical analysis, Shewhart charts, economic and mathematical modeling.

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Introduction

Under conditions of sanctions restrictions and geopolitical tensions, the intensification of pro-inflationary factors, and the growing deficit of investment, labor, and other resources, the assessment of the sustainability and financial stability of the development of territorial socio-economic systems, as well as the modeling of factors driving their dynamics, are becoming increasingly relevant. A detailed assessment of the financial stability of these systems at the national, regional, and municipal levels, together with the identification of key risks to its decline, is essential for developing optimal regulatory mechanisms and achieving balanced financial development of territories.

In the scholarly literature, financial sustainability and financial stability in the development of socio-economic systems are often treated by many authors as synonymous concepts characterizing the ability of systems to maintain resilience under the impact of various adverse factors. This approach has been adopted by N.D. Shimshirt (Shimshirt, 2011), M.V. Avdeeva (Avdeeva, 2017), I.N. Gravshina, and N.I. Denisova (Gravshina, Denisova, 2023). Specifically, V.K. Burlachkov considered financial stability as the stability of financial markets and financial institutions, as well as the sufficiency of liquidity and capital of financial institutions to cover potential losses (Burlachkov, 2011). This approach is also shared by the Central Bank of Russia, which defines financial stability as "the resilience of the financial system to shocks and its uninterrupted and efficient functioning"[1]. However, the vast majority of indicators used by the Central Bank to assess the financial stability of territorial systems are better suited for assessing their financial sustainability. These include, for example, the share of household savings held in foreign instruments, the share of unsold housing in multi-apartment buildings under construction, the volume of mortgage and unsecured consumer loans extended to individuals with a debt-to-income ratio exceeding 80%, the household debt service

[1] Financial stability of financial markets. Central Bank of the Russian Federation. Available at: https://cbr.ru/finstab/

ratio, and others. This approach complicates the assessment of the financial stability of territorial systems' development.

Nevertheless, the concepts of "sustainability" and "stability" of a socio-economic system are distinct: sustainability characterizes a system's ability to maintain its current, equilibrium state over time under the influence of external factors (shocks); stability characterizes a system's ability to preserve its structure and maintain uninterrupted and efficient functioning despite external impacts. While stable systems are static and unchanging over time, sustainable systems may be dynamic, with their parameters potentially changing over time while preserving the overall sustainability of the system. A stable, time-invariant socio-economic (territorial) system may develop unsustainably. Such a situation is currently observable in the Russian economy: external shocks – caused by sanctions pressure, restrictions on goods exports and technology and equipment imports, rising inflation, and the tight monetary policy of the Central Bank of Russia – have led to a deficit of investment and human resources in the productive sector, the inaccessibility of credit resources, and a decline in the solvency of enterprises and households. That is, they have led to a decline in the financial sustainability of territorial systems. At the same time, their financial stability persists: the financial system – comprising the banking sector, the insurance sector, pension funds, investment companies, and the system of public finance – continues to function in its regular mode.

It is for this reason that the assessment of the financial stability of territorial socio-economic systems requires methodological approaches distinct from those proposed for assessing the financial sustainability of these systems. The present study is devoted to the development of such a methodological approach.

According to our hypothesis, the proposed methodological approach will enable a more systematic assessment of the financial stability of a territory's socio-economic development by examining all its elements in their totality, revealing factors that exert a negative influence on the financial stability of socio-economic systems' development, and formulating the most probable forecast scenarios of their future dynamics. We assume that the approbation of this approach will make it possible to identify trends of declining financial stability at the regional and municipal levels – trends that have not been detected within the framework of currently applied methodological approaches.

Theoretical and methodological approaches to assessing the financial stability of territorial systems' development

A theoretical review of scholarly works on this topic reveals that the assessment of the financial stability of the development of territorial socio-economic systems predominantly employs two approaches: statistical and economic-mathematical. Statistical analysis involves the assessment of variation in the dynamics of financial development across different elements of the system using indices and indicators, as well as their graphical analysis by means of control charts. Mathematical modeling, in turn, comprises factor analysis of the impact of external shocks on the dynamics of financial development. Let us examine the specific features of the application of these approaches to the assessment of the financial stability of territorial development by Russian and foreign researchers.

The index/indicative approach to assessing financial stability of development has been employed by O.V. Makashina, L.M. Borshch, D.D. Burkaltseva, D.N. Mikhailova, E.A. Zakharchuk, A.F. Pasynkov, M.V. Korotich, P.V. Trunin, M.V. Kamenskikh, and other scholars. For instance, in assessing the financial condition of territories, O.V. Makashina applied a model for assessing the financial sustainability of the budget through a system of indicators characterizing the dynamics of budget revenues and expenditures, tax and

non-tax revenues, intergovernmental transfers, and others (Makashina, 2010). The methodological approach presented in that work assesses the financial stability of the development of only one element of the territorial system – namely, public administration – while ignoring the assessment of the financial stability of economic entities, households, and financial institutions.

The financial stability of regional development, assessed through their financial sustainability, was examined by L.M. Borshch, D.D. Burkaltseva, and D.N. Mikhailova. Their methodological approach, aimed at assessing the budgetary and investment capacity of the regions of the Southern Federal District, likewise presumes the examination of only one element of the system (Borshch et al., 2021).

The indicative methodological approach was employed by P.V. Stroev and other researchers in assessing the socio-economic development and budgetary-financial sustainability of the constituent entities of the Russian Federation (Stroev et al., 2023). However, a significant proportion of the indicators used by the authors characterize not financial, but rather socio-economic development of the regions. The financial sustainability of territories is assessed exclusively from the perspective of budgetary capacity. The same approach to assessing the financial sustainability of regions was employed in the works of T.A. Naidenova and I.N. Shvetsova (who presented a methodological toolkit for the comprehensive assessment of the financial sustainability of budgets of the constituent entities of the Russian Federation) (Naidenova, Shvetsova, 2017); T.A. Zhuravleva, E.M. Semenova, and O.M. Goltsova (who proposed a system of indicators assessing the performance of the regional budget, its financial sustainability, and the balance of its revenue and expenditure components) (Zhuravleva et al., 2021); E.A. Chumakova, O.V. Darelina, and L.V. Shamray-Kurbatova (who proposed an approach to assessing the financial sustainability of a municipal formation through the prism of criteria depending on the degree of their influence on the economic security of the territory: budget expenditure coverage; decent standard of living; budget balance; limitations on the volume of municipal debt; level of external financing; endowment with investment resources; profitability of organizations) (Chumakova et al., 2022); and A.V. Minakov and T.N. Agapova (who employed indicators of the financial sustainability of budgets of the constituent entities of the Russian Federation) (Minakov, Agapova, 2022).

An integral indicator – the financial sustainability index of small towns, employed by M.V. Korotich – also characterized the budgetary capacity of territories. In its calculation, the author applied such indicators as: the capitalization ratio (sufficiency of the town's own budgetary funds); the maneuverability (mobility) ratio of own revenues, characterizing the volume of tax and non-tax revenues; the financing ratio (the town's dependence on transfers); the ratio of gratuitous receipts; and the budget expenditure efficiency ratio (Korotich, 2014). The integral indicator of financial sustainability itself was assessed by the author using a simple arithmetic mean, without the application of weighting coefficients. A similar methodological approach to assessing the financial sustainability of territories from the perspective of their budgetary capacity – albeit exclusively at the regional level – was proposed by O.B. Ivanova and S.S. Vergun, who developed a rating system for the rapid assessment of the level of financial sustainability of territories, combining quantitative and qualitative evaluative criteria (Ivanova, Vergun, 2014).

The financial sustainability of municipal formations, assessed from the perspective of their budgetary capacity and the unprofitability of enterprises, was also examined by Kh.S. Pak, E.V. Ushakova, and R.V. Bolshakov (Pak et al., 2018). They proposed an integral coefficient of financial sustainability that takes into account: own

revenues and expenditures of the local budget; the level of overdue accounts payable and receivable of enterprises; and the share of unprofitable organizations in the region. The approach they presented does not provide for the assessment of the financial stability of the development of households and financial institutions.

I.N. Gravshina and N.I. Denisova presented a methodological approach to assessing the financial sustainability of a region that considers not only its budgetary capacity but also the dynamics of socio-economic development. The authors proposed evaluating the financial sustainability of a territory using indicators of: gross regional product (GRP) dynamics; per capita money income of the population; unemployment rate; share of unprofitable enterprises; accounts payable of enterprises; volume of their fixed capital investment; and expenditures on innovation activity (Gravshina, Denisova, 2023). However, not all of the proposed indicators characterize the financial sustainability of the territorial system; they are more oriented toward assessing its economic security and do not reflect the financial sustainability of the public administration sector or financial institutions (the banking sector of the economy).

P.V. Trunin and M.V. Kamenskikh, drawing upon a "signal" approach to the selection of indicators as precursors of crisis, compiled a list of indicators capable of providing early warning of impending financial instability. The authors constructed a composite financial stability index, enabling a quantitative assessment of the onset of financial instability. It was found that the probability of financial instability increases nonlinearly as the number of signals generated by the working indicator-precursors grows: if only a small number of indicators signal, the probability of financial instability remains low; however, as alarming symptoms accumulate, the probability of instability in the financial market increases sharply (Trunin, Kamenskikh, 2007). The indicators proposed by the authors assessed, first and foremost, the financial stability of the development of the financial (banking) sector of the economy and of public administration (e.g., current account balance of payments; real interest rate on the interbank lending market; ratio of money supply to gold and foreign exchange reserves; real effective exchange rate of the ruble; GDP growth rate; volume of goods exports; volume of gold and foreign exchange reserves; etc.). The presented methodological approach can be used exclusively for assessing the financial stability of territorial system development at the national level.

A more systemic approach to assessing the financial stability and sustainability of the development of territorial systems was proposed by O.V. Goncharuk and Yu.E. Putikhin. Within their approach, the financial system of a region is conceptualized as an aggregate of interacting and interconnected sectors: the sector of state and municipal finance; the financial sector; and the regional sector of corporate and personal finance (Goncharuk, Putikhin, 2021). However, the indicators presented by the authors characterize the ratio of financial resources of the considered economic sectors to the volume of gross regional product and to the total capital of these sectors – that is, they assess exclusively the financial sustainability of territorial development. Such an approach lacks universality and is applicable solely to the assessment of the financial sustainability of regional systems.

For the assessment of the financial sustainability of territorial systems at the regional level and the development of mechanisms for its stabilization, I.V. Naumov developed a monitoring system comprising: a block of indicators warning of the threat of loss of financial sustainability of a territory at the macroeconomic level; financial and credit indicators of territorial development at the regional

level; and a block of indicators for analyzing the consequences of changes in financial sustainability – a block of indicators characterizing socio-economic sustainability (Naumov, 2013). During the approbation of this system, it was revealed that the methodological approach can be used to assess the financial stability of the development of territorial systems, but exclusively at the regional level, and does not provide for the assessment of the financial stability of the development of the public administration sector (budgetary capacity) of territories.

An Aggregate Financial Stability Index *(AFSI)* was proposed in the work of F. Ahamed and A.R. Chowdhury to assess the "systemic health" and resilience of the financial system of Bangladesh over the period from 2016 to 2024. The index consolidated 19 macro-financial indicators across the real, monetary-financial, fiscal, and external sectors of the economy. Employing a normalized approach to indicator valuation and equal weighting coefficients, the authors aggregated sub-indices to form a composite indicator of financial stability (Ahamed, Chowdhury, 2025). This approach is also not universal, as it does not account for the household sector in assessing the financial stability of territorial development and relies on indicators characterizing the dynamics of financial development of territories exclusively at the macroeconomic level.

E.A. Zakharchuk and A.F. Pasynkov developed methodological provisions for assessing the financial sustainability of local territories based on the construction of a System of National Accounts (SNA). The authors proposed an algorithm for determining indicators of the financial sustainability of a territory using a multidimensional model for identifying its financial flows (Zakharchuk, Pasynkov, 2018). The approach employed by these authors is fundamentally different from those previously considered, as it does not rely on a system of indicators characterizing the financial development of individual elements of the territorial system (enterprises, financial institutions, the public administration sector, and households), but rather presents an entire system of financial flows between them. This system can be used to assess both the financial sustainability and the financial stability of their development.

Based on an analysis of financial stability metrics employed by the world's leading central banks and recommended by international financial organizations, Yu.A. Danilov, D.A. Pivovarov, and I.S. Davydov formulated proposals for the modernization of the system of financial stability indicators used by the Bank of Russia. The authors proposed the introduction of new indicators, such as: yield spreads between two-year and ten-year government bonds in the USA, Germany, Great Britain, Japan, and China; financial conditions indices calculated by international financial organizations, rating agencies, and US Federal Reserve Banks; the stock market volatility index – VIX; the ratio of commercial real estate prices to annual commercial property rent; an indicator of excessive credit growth in the real sector (according to the methodology developed by the World Bank); the ratio of residential real estate prices to annual residential rent; the share of individuals in the total volume of open positions on the exchange market for derivative financial instruments; and others (Danilov et al., 2021). The approach proposed by the authors develops the methodological toolkit for assessing the financial stability of territorial development at the macroeconomic level currently employed by the Central Bank of Russia and, unfortunately, cannot be used at the regional and municipal levels of governance.

The development of a systemic methodological approach to assessing the financial stability of territorial development at the macroeconomic level was also addressed by S.V. Kadomtseva and M.A. Israelyan. They proposed a system of indicators assessing the development dynamics of the corporate and financial sectors of the economy, households, financial markets, and the external sector, and also calculated an early warning index of the potential for financial instability in Russia (Kadomtseva, Israelyan, 2016). The methodological approach developed by these authors is also applicable only at the macroeconomic level.

In addition to the indicative method, other statistical research methods have been employed in assessing the financial stability of territorial development – namely, W. Shewhart's and H. Hotelling's control charts, which graphically reflect the dynamics of the development of the object under study over an extended period of time. By means of horizontal lines plotted on the chart, reflecting the boundaries of the stable state of the assessed process, points at which the system exits its stable, controlled state are identified, and the causes of the disruption of the stability of its development are established. The construction of such control charts is governed by GOST R ISO 7870-2–2015, which establishes the fundamental provisions for the application and interpretation of Shewhart's control charts and corresponding methods of statistical process control[2]. According to V.L. Shper and other researchers, W. Shewhart's control charts are, on the one hand, a powerful, and on the other hand, a technically simple tool for analyzing process variability (Shper et al., 2024). As noted by E.M. Grigorieva, they are intended for monitoring dynamic processes with the aim of their analysis, regulation, and control (Grigorieva, 2023).

The study by V.N. Klyachkin and I.N. Karpunina demonstrated that methods of statistical/graphical analysis of processes are actively employed for assessing the stability of the functioning of technical systems, the efficiency of the organization of production processes, and the quality control of manufactured products. The authors concluded that, when investigating the dynamics of independent indicators, it is optimal to use traditional Shewhart's control charts, while for correlated indicators, methods and algorithms based on H. Hotelling's multivariate statistics and generalized variance are preferable (Klyachkin, Karpunina, 2018). In that work, the authors presented a methodology for constructing such charts, which involves: assessing the operating conditions of analogous systems and identifying possible disruptions in the stability of their functioning; calculating the main statistical characteristics of the process; selecting statistical tools for subsequent control depending on the anticipated disruptions and the level of correlation of parameters; and conducting continuous monitoring of the system's functioning for the purpose of diagnosing stability disruptions.

The principal advantage of control charts lies in the simplicity of their construction and use for diagnosing the controllability and stability of the process under study, as well as for visualizing the points at which the system exits its stable state. The juxtaposition of such charts with the dynamics of changes in the factors influencing the processes under study, and the plotting of key events on the charts that lead to significant changes in the dynamics of these processes, forms a powerful toolkit for identifying the main triggers of system destabilization and for developing and adopting effective management decisions. At the same time, there exist limitations in the use of this method that reduce its

[2] GOST R ISO 7870-2-2015. Statistical methods. Control charts. Part 2. Shewhart's control charts. Moscow: Standartinform, 2016. 42 p.

effectiveness: the laboriousness of forming time series for assessment (problems of stationarity, comparability of data series, representativeness of the samples used); problems of selecting the method for estimating mean values for constructing the central line on a Shewhart's chart (methods for calculating the arithmetic mean, median, weighted averages, etc., are employed); as well as the problem of selecting the method for calculating control limits displayed on the chart (standard deviations, range of variation, and other methods for estimating the variation of indicator values are used). These methodological issues in the construction of control charts increase the subjectivity of the use of this toolkit in assessing the stability of the financial development of territories.

Researchers have also employed economic-mathematical modeling of the financial stability of territorial development. A methodological approach to the construction of mathematical models in the form of both discriminant and regression equations for assessing financial sustainability was developed by G.V. Polygalov and O.A. Mishchenko. They performed calculations to determine the risk of loss of financial sustainability by municipalities on the basis of discriminant, regression, and neural network analysis (Polygalov, Mishchenko, 2020).

A.G. Vasilyeva and V.M. Gafurova proposed a systemic approach to assessing the effectiveness of managing the financial sustainability of regional systems, based on an economic-statistical method of scientific inquiry – the method of analyzing correlation dependencies between an "integral indicator of financial sustainability" and the "growth rates of indicators of socio-economic well-being" of territorial systems (Vasilyeva, Gafurova, 2016).

To assess the factors promoting financial stability in Nigeria over the period from 2002 to 2021, P.K. Ozili employed two-stage least squares regression and modified ordinary least squares (OLS) methods (Ozili, 2025). In constructing this model, the factors considered included: the volume of assets of the banking sector of the economy; the return on assets of lending institutions; the bank cost-to-income ratio; the number of bank accounts per 1,000 adult clients; as well as GDP growth rates, the unemployment rate, and the inflation rate as control variables. Thus, in this study of the financial stability of territorial development, the author assessed the influence of only one factor – the banking sector of the economy.

Regression analysis and other methods of economic-mathematical modeling have been applied primarily to assess the financial sustainability of territories at the macroeconomic and regional levels. This toolkit is used predominantly by the Central Bank of Russia at the macroeconomic level to identify the most effective instruments of macroprudential policy aimed at preventing the formation of bubbles in the economy and financial sphere and mitigating the consequences of shocks for the economy. Such a toolkit, in combination with W. Shewhart's control charts, opens up broad opportunities not only for assessing the financial stability of the development of territorial systems, but also for forecasting alternative scenarios for the unfolding of their dynamics in the future.

A methodological approach to assessing the financial stability of the development of a territorial socio-economic system

The theoretical review of the literature has demonstrated that the financial stability of the development of territorial socio-economic systems is assessed fragmentarily, with only individual elements of this system being addressed. Most frequently, studies examine the financial stability of the development of individual enterprises and economic sectors, or of credit institutions and the banking sector as a whole, as well as the stability of changes in the

budgetary capacity of territories at the regional and national levels. At the same time, the assessment of the financial stability of the development of households is entirely ignored. Such an approach does not permit an assessment of the financial stability of the development of the territorial socio-economic system as a whole. In this connection, there is a need for the development of a systemic methodological approach that would make it possible to assess the financial stability of the development of all its elements: financial institutions, enterprises of all types of economic activity, households, and the public administration sector. This approach will help to identify the most vulnerable elements of the system – those whose stability of development is under threat – and, subsequently, to select more effective mechanisms for stabilizing the financial development of the territory.

To obtain objective results at the initial stage of assessing the financial stability of the development of these elements, it is proposed to employ an entire system of methodological tools, including in particular: the coefficient of variation, which reflects the variability of the dynamics of the assessed indicators relative to their mean level; and the construction of a W. Shewhart's control chart to identify control limits, exceeding which indicates a disruption of the financial stability of the system's development.

It is proposed to assess the financial stability of the development of each element of the territorial system according to the variation of indicators characterizing their development, with the calculation of an integral indicator aggregating their values. Variation exceeding 33.3% (one standard deviation from the mean) will indicate variability in the dynamics of the assessed indicators over time, while a value exceeding 99.9% will indicate a disruption of stability in the development of the assessed element of the socio-economic system. To calculate the integral indicator of the financial stability of the development of an element of the territorial socio-economic system ($\bar{V}\imath$), it is proposed to use the geometric mean of their variation (1):

$$\bar{V}\imath = \sqrt[n]{V_{i1} * V_{i2} * V_{i3} * \dots * V_n}, \qquad (1)$$

where

$$V_i = \frac{\sqrt{\frac{\sum(X_i - \bar{X})^2}{n}}}{\bar{X}} * 100\%;$$

$\bar{V}\imath$ – integral indicator of variation of the financial development of an element of the territorial socio-economic system, %;

V_i – variation of an indicator characterizing the financial stability of the development of an element of the system over the considered time period, %;

X_i – indicators used to assess the financial stability of the development of the system's elements;

n – considered period of assessment of the indicators.

Since the variation indicators characterizing the financial stability of the development of a given element of the system are measured in percentages, the geometric mean is the optimal type of integral indicator to be calculated. In its calculation, we do not apply weighting coefficients to the assessed elements, as we consider them to be equally significant characteristics of the financial stability of the socio-economic development of the territorial system.

When assessing the financial stability of the development of enterprises of different economic sectors at the regional and municipal levels, we propose to use the following indicators: absolute liquidity ratio and quick (acid-test) liquidity ratio, reflecting the ability of enterprises to cover short-term liabilities; equity ratio (financial independence ratio), determining the share of equity capital in the total volume of funds from all sources; financial leverage ratio, characterizing the ratio of debt to equity capital of enterprises; equity maneu-

verability ratio, reflecting the share of capital in circulation and not invested in non-current assets; share of short-term liabilities in their total volume; ratio of gross profit of enterprises to the volume of their assets; profitability level of the use of current and non-current assets; provision of enterprises with material and technical inventories and operating capital. These indicators reflect the specific features of the financial development of enterprises in various sectors of the economy and are typically employed by researchers to assess their financial sustainability; the assessment of the stability of their dynamics will make it possible to draw conclusions about the financial stability of the development of this element of the territorial system.

The calculation of the indicators presupposes the preliminary aggregation of data from primary accounting records of enterprises, disaggregated by sector and territory, in dynamics over the last 20 years. For the correct calculation and assessment of the dynamics of the indicators (2), and to take into account the sectoral specificities of enterprises within the territorial system, it is proposed to employ corrective weighting coefficients characterizing the contribution of sectors to the output of products in the territorial system (the share of shipped products of enterprises of each sector in their total volume):

$$V_i = \frac{k_1 * X_1 + k_2 * X_2 + \cdots k_n * X_n}{n}, \qquad (2)$$

where

V_i – variation of an indicator characterizing the financial stability of the development of enterprises of all economic sectors in the territorial system, %;

X_i – indicator used to assess the financial stability of the development of enterprises;

K_i – corrective coefficient from 0 to 1, characterizing the share of the sector in the volume of shipped products in the territorial system;

n – number of economic sectors under study in the territorial system.

The list of assessed indicators, should a more detailed study of the stability and sustainability of the development of enterprises be required, can be significantly expanded by including indicators of turnover of current and non-current assets, production inventories, accounts receivable and accounts payable, and the profitability of their use. The aggregation of primary data from enterprises' financial statements makes it possible to conduct a more detailed assessment of the financial stability of their development at both the regional and municipal levels of governance – an undertaking that is difficult when using officially published statistical data.

When assessing the financial stability of the development of the public administration sector at the municipal level, it is proposed to employ the following indicators: share of tax and non-tax budget revenues in the total volume of own budget revenues, %; surplus and deficit of the actually executed local budget, million rubles; share of own revenues in the total volume of budget revenues, %; volume of fixed assets at the end of the year at full book value for organizations of municipal ownership, million rubles; volume of fixed capital investment financed from the local budget, million rubles; share of unprofitable organizations in the housing and communal services sector, %; collection rate of payments for housing and communal services rendered, %; share of repaired local public roads with hard surface for which major repairs have been carried out, %; length of repaired street gas network during the reporting year, m; length of replaced heating and steam networks in double-pipe terms during the reporting year, m; length of replaced water supply networks during the reporting year, m; length of replaced sewerage networks during the reporting year, m.

These indicators are calculated by the Federal State Statistics Service and are presented in the Database of Municipal Formations[3]. They reflect the financial capacity of the territory, the sustainability of its financial development, as well as the dynamics of attracted investments in the development of the engineering infrastructure of territories, and should therefore be used to assess the financial stability of the development of the public administration sector at the municipal level. The list of indicators employed may be expanded, subject to the availability of statistical data. To calculate the integral indicator characterizing the financial stability of the development of this sector of the economy, it is proposed to employ Formula (1) without the application of weighting coefficients.

When assessing the financial stability of the development of the public administration sector at the regional level, the following indicators should be employed: ratio of revenues to expenditures of the budget of a constituent entity of the Russian Federation; share of taxes, fees, and other mandatory payments received in the total volume of budget revenues of a constituent entity of the Russian Federation, %; share of receipts from the Pension Fund of the Russian Federation and the Social Insurance Fund in the total volume of budget revenues of a constituent entity of the Russian Federation, %; ratio of public debt to the volume of budget revenues received by a constituent entity of the Russian Federation; volume of debt securities issued by a constituent entity of the Russian Federation, million rubles; volume of loans received by a constituent entity of the Russian Federation from credit institutions, foreign banks, and international financial organizations, million rubles; volume of budget loans received by a constituent entity of the Russian Federation from other budgets of the budgetary system of the Russian Federation, million rubles; volume of state guarantees issued and other debt securities, million rubles.

Their use will make it possible to assess not only the financial stability of the dynamics of the budgetary capacity of Russia's regions, but also the level of their budget security. A value of the integral indicator exceeding triple the standard deviation from the mean will indicate a destabilization of the financial development of a constituent entity of the Russian Federation, reflecting a significant increase in its budgetary capacity driven by a rise in public debt.

To calculate the integral indicator characterizing the financial stability of the development of financial institutions at the regional level, it is proposed to employ the following indicators: number of credit institutions and their internal structural subdivisions (branches) in a constituent entity of the Russian Federation, units; share of unprofitable credit institutions in a constituent entity of the Russian Federation, %; volume of funds attracted by credit institutions from organizations, and bank deposits of legal entities and individuals, million rubles; volume of issue of equity securities of Russian issuers (shares and bonds), including those of credit institutions, million rubles; volume of loans granted to legal entities – residents and individual entrepreneurs, million rubles; volume of loans granted to individuals – residents, million rubles; volume of debt on loans granted to legal entities – residents and individual entrepreneurs, million rubles; volume of debt on loans granted to individuals – residents, million rubles.

The statistical data necessary for the assessment of these indicators are published by the Central Bank of Russia disaggregated by region, taking into account the presence of internal structural subdivisions (branches) of federal banks in the constituent entities of the Russian Federation. At the municipal level, the assessment of the financial stability of the development of financial institutions is complicated, since statistical data and annual financial reports are submitted by these institutions in a consolidated form, without disaggregation of data by territorial subdivisions.

[3] Database of Municipal Formations. Available at: https://rosstat.gov.ru/dbscripts/munst/munst65/ DBInet.cgi#1

In assessing the financial stability of the development of territorial socio-economic systems, a crucial aspect is the study of the stability of the development of households. It is households that are the final consumers of goods produced and services rendered in territorial systems, and they shape the budgetary capacity of these systems. A disruption of the financial stability of their development may create threats of a decline in the financial sustainability of enterprises, the banking sector of the economy, and the public administration sector.

When assessing the financial stability of the development of households at the municipal level, the indicators presented in the Rosstat Database of Municipal Formations may be employed, including in particular: average number of employees of organizations; average monthly wage of employees of organizations; volume of overdue wage arrears of employees of organizations; number of families receiving subsidies for the payment of housing and utilities during the reporting period; volume of social payments to the population; share of the population residing in apartment buildings recognized as unfit for habitation in accordance with established procedure; and others.

When assessing the financial stability of the development of households at the municipal and regional levels, a broader range of indicators may be applied, characterizing not only the level of their money income, but also their indebtedness (credit burden). In particular, it is proposed to employ the following indicators: volume of deposits of individuals attracted by credit institutions, million rubles; volume of loans granted by credit institutions to individuals, million rubles; volume of housing loans granted by credit institutions to individuals, million rubles; volume of debt of individuals on loans in rubles and foreign currency, million rubles; median per capita money income of the population, thousand rubles; population with money incomes below the poverty line/subsistence minimum, persons; volume of subsidies granted to citizens for the payment of housing and utilities, million rubles.

The coefficients of variation calculated for the above indicators, and the integral indicators aggregating their values for enterprises, financial institutions, the public administration sector, and households, will make it possible to assess the level of financial stability of their development that has been observed over the entire time period under consideration.

It should be noted that a significant proportion of the presented indicators for assessing the financial stability of a territorial system (indicators expressed in monetary terms) exhibit a wide range of variation, and the longer the time series used to calculate the coefficients of variation, the higher the calculated values of the coefficients. This complicates the assessment of the financial stability of the elements of the territorial system. Therefore, for the correct calculation of the coefficients of variation, a preliminary adjustment of monetary indicators for inflation is presupposed, as well as the use of the geometric mean in calculating the integral indicator of financial stability, which mitigates the negative consequences of significant volatility of indicators.

To assess the dynamics of changes in indicators of their financial development over time and to identify turning points indicating a disruption of the stability of the assessed processes, the next stage of the study proposes the construction of W. Shewhart's control charts *(Figure)*. The central line of this chart characterizes the mean (median) value of the assessed indicator over time, while the upper and lower limits, located at a distance of three standard deviations ($\pm 3\sigma$) from it, constitute the control limits, exceeding which signals a disruption of the stability of the process.

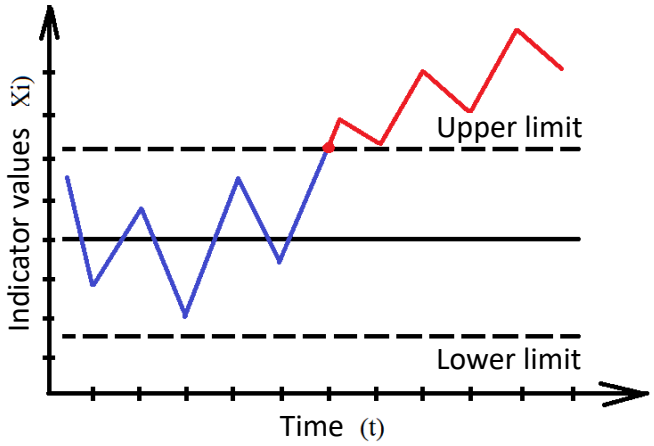

Fig. W. Shewhart's control chart
Note: own compilation.

According to such a chart, stable financial development of elements of the socio-economic system is observed within the specified control limits, and the closer the values of the assessed indicators approach the central line, the more stable their dynamics. A disruption of the stability of the dynamics of the assessed processes is signaled not only by exceeding the control limits, but also by the formation of a sustained (prolonged) upward or downward trend in its dynamics.

In practice, various modifications of this chart are applied: with intermediate warning lines between the central and control lines (at a distance of one or two standard deviations); using the range of variation or individual values of moving ranges instead of standard deviations; and also using the median level instead of the arithmetic mean when determining the central line. To simplify the process of assessing the financial stability of the development of enterprises, financial institutions, the public administration sector, and households, it is proposed to construct standard Shewhart control charts for all assessed indicators — with the calculation of the mean value for plotting the central line on the chart and three standard deviations for determining the control limits (see Figure):

Values of the assessed indicators falling within the range presented in equation (3) will indicate moderate variability of their dynamics and the financial stability of the development of the assessed element of the territorial system:

$$\bar{X} - 3 * \sqrt{\frac{\sum(X_i - \bar{X})^2}{n}} < X_i < \bar{X} + 3 * \sqrt{\frac{\sum(X_i - \bar{X})^2}{n}}. \quad (3)$$

Values falling outside this range (the control limits) signal a disruption of the financial stability of the development of the assessed element of the system.

Since an important aspect in assessing the stability of the development of any socio-economic system is the study of the risks (external shocks) that destabilize its development, the next stage proposes to assess the influence of factors on the dynamics of key indicators characterizing the financial development of the considered elements of the territorial socio-economic system. A list of such indicators is presented in the *Table*.

In constructing such models, it is proposed to employ two types of indicators as dependent variables (*Y*), characterizing, on the one hand, the financial performance of the development of elements of the territorial socio-economic system, and on the other hand, their financial sustainability.

Table. List of variables for regression modeling of the dynamics of financial development of enterprises, households, financial institutions, and the public administration sector in the territorial system

Dependent variables (Y)		Factors assessed in the regression model (X)
Enterprises	Absolute or quick (acid-test) liquidity ratio	Level of financial independence (equity ratio) of enterprises Turnover of current assets of enterprises Provision of enterprises with inventories and operating capital Profitability (unprofitability) of sales, % Profitability of the use of current assets, % Interest rate on bank loans for legal entities in Russian rubles, %
	Profitability of core activities of enterprises, %	Inflation rate in the region, % Foreign exchange rate (US dollar), RUB Labor productivity at enterprises, RUB/person Volume of fixed capital investment, RUB Depreciation of fixed production assets, % Number of advanced production technologies developed, units Volume of exports of technologies and technical services, RUB
Public administration	Surplus / deficit of the actually executed budget of the municipal formation	Inflation rate in the region, % Foreign exchange rate (US dollar), RUB Weighted average interest rate on bank loans for legal entities and individuals, % Number of economically active population in the region, persons Volume of fixed capital investment by enterprises, RUB Volume of fixed capital investment carried out by organizations located in the municipal formation, million RUB Volume of expenditures on innovation activities of organizations, million RUB
	Share of own revenues in the total volume of budget revenues of the municipal formation, %	Share of profitable organizations in the municipal formation, % Volume of shipped goods of own production, works and services performed in-house, million RUB Number of economically active population in the region, persons Volume of non-current assets of enterprises, million RUB Volume of residential buildings commissioned, sq. m Number of municipal unitary enterprises in the municipal formation, units
Households	Average monthly wage of employees of organizations, thousand RUB	Inflation rate in the region, % Average number of employees of organizations, persons Migration increase in the municipal formation, persons Volume of shipped goods of own production, works and services performed in-house, million RUB Profitability of core activities of enterprises, % Labor productivity at enterprises, RUB/person Volume of accounts receivable of enterprises, million RUB
	Volume of debt of individuals on loans in rubles and foreign currency, million RUB	Weighted average interest rate on bank loans for individuals, % Level of wage arrears of enterprises, million RUB Share of unprofitable organizations in the municipal formation, % Volume of accounts receivable of enterprises, million RUB Level of financial independence (equity ratio) of enterprises
Financial institutions	Volume of funds attracted by credit institutions, bank deposits, million RUB	Weighted average interest rate on bank deposits for legal entities and individuals, % Average monthly wage of employees of organizations, thousand RUB Profitability of core activities of enterprises, % Share of profitable organizations in the municipal formation, % Provision of enterprises with inventories and operating capital
	Volume of debt on loans granted to legal entities and individuals, million RUB	Inflation rate in the region, % Turnover of current assets of enterprises Level of financial independence (equity ratio) of enterprises Absolute liquidity ratio of enterprises Volume of accounts receivable of enterprises, million RUB Volume of administrative and commercial expenses of enterprises, million RUB
Source: own compilation.		

Thus, for the construction of a regression model assessing the influence of internal and external factors on the dynamics of the financial development of enterprises of all economic sectors within the territorial system, it is proposed to employ as dependent variables: the indicator of profitability of core business activities and the absolute or quick (acid-test) liquidity ratio, which characterizes the sufficiency of liquid assets to cover short-term liabilities – that is, the level of their solvency. At this stage, it is also planned to construct regression models assessing the influence of both external and internal factors on: the dynamics of the volume of surplus/deficit of the actually executed budget of municipal formations and the share of own revenues in their total volume – reflecting the level of budgetary capacity of territories and the risks of its decline; the influence of factors on the dynamics of the average monthly wage of employees of organizations and the debt of individuals on loans in rubles and foreign currency; and on the dynamics of the volume of funds attracted by credit institutions, bank deposits, and the debt on loans granted to legal entities and individuals.

Thus, Table 1 presents indicators that may generate risks of a decline in the financial stability of the development of the considered elements of the territorial system, and which are available in statistical databases. Their list may be substantially expanded when constructing regression models.

The constructed regression models will make it possible to identify the main factors driving changes in the financial stability of the development of enterprises, public institutions, households, and credit institutions, as well as to formulate, as a result of applying stress-testing of model parameters, forecast scenarios of changes in their financial stability. For the formulation of such scenarios, it is proposed to employ autoregressive moving average modeling – *ARMA/ARIMA* (depending on the stationarity or non-stationarity of the time series). The forecast bounds of the factors established as a result of modeling, with a 95% confidence interval, may be used to formulate the most pessimistic and most optimistic scenarios of changes in the dynamics of the financial development of the assessed elements of the territorial socio-economic system. In the course of stress-testing the model parameters, it is proposed to combine the forecast values for all factors within the established ranges to formulate alternative forecast scenarios of changes in the dynamics of the financial development of the system's elements.

Thus, the presented methodological approach, in contrast to those currently applied, presupposes a systemic assessment of the financial stability of the development of all elements of the territorial socio-economic system: enterprises of all economic sectors, financial institutions, the public administration sector, and households, employing various research methods and forecasting of their development dynamics. The distinguishing features of this methodological approach are: the use of coefficients of variation to assess the financial stability of both individual elements of the territorial system and their entire aggregate – for the calculation of an integral indicator of the financial stability of the territory; the application of Shewhart's control charts to assess the stability of the dynamics of the considered indicators of the financial development of elements of the territorial system; the use of regression analysis, in contrast to other methodological approaches, not only to assess the influence of factors on the dynamics of the financial

stability of elements of the territorial system, but also to construct forecast scenarios of its future changes; for the implementation of this task, the use of autoregressive moving average modeling of the dynamics of financial stability indicators (ARMA/ARIMA modeling) was proposed. Such an approach will permit a more objective assessment of the financial stability of territories, the identification of factors destabilizing their development, and the selection of more effective mechanisms for enhancing their financial stability.

The presented approach will be approbated in the course of a study of the financial stability of the regions and their municipal formations comprising the Ural Federal District over the period from 2010 to 2023. As a result of the approbation of the methodological approach, it is expected to identify: territories with a significant disruption of the financial stability of socio-economic development; territories where a decline in financial stability is observed, which has not yet reached a critical level; as well as financially stable regions. This will make it possible, in the future, to determine spatial priorities for state financial support and to develop mechanisms for stabilizing their financial position.

Conclusion

The theoretical review of the literature has demonstrated that currently existing methodological approaches are aimed at assessing the financial stability of the development of individual elements of territorial socio-economic systems (financial institutions, enterprises of various types of economic activity, households, and the public administration sector), while approaches presupposing their systemic assessment can be used only at the macroeconomic level. The methodological approach presented in this paper conceptualizes the territory as a socio-economic system and presupposes the assessment of the financial stability of the development of all its elements using a suite of statistical and econometric methods.

The proposed methodological approach forms a system of indicators for assessing the financial stability of all elements of the territorial system: enterprises of various economic sectors, financial institutions, the public administration sector, and households. It permits not only the identification of an already observed disruption of the financial stability of the development of elements of the territorial system (by means of the coefficient of variation) and of the entire territorial system, but also, using W. Shewhart's control charts and control limits, the assessment of the dynamics of change of the considered indicators – which will make it possible to identify emerging risks of a decline in the financial stability of elements of the territorial system. To confirm the emerging risks of a decline in financial stability identified as a result of the construction of Shewhart's control charts, the author's methodological approach presupposes the construction of regression models reflecting the influence of external and internal factors on the dynamics of key indicators of financial stability of each element of the territorial system. These models will make it possible to identify the factors destabilizing the development of territorial systems, while their autoregressive moving average modeling (ARMA/ARIMA) will make it possible to forecast possible destabilization of territorial systems in the future, and, as a result of stress-testing of model parameters, to formulate a system of forecast scenarios of the dynamics of their financial development. Such an approach to assessing the financial stability of a territorial system provides regional and municipal public authorities with the opportunity to develop effective mechanisms for regulating emerging threats of a decline in the financial stability of the development of territorial systems.

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