

Original Paper

doi 10.15826/recon.2023.9.4.025

UDC 332.12, 336.221.26

JEL H2, E3

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Assessment of the level and structure of stress in tax revenues of the federal and regional budgets

Relevance. In recent years, the Russian economy has faced the global challenges posed by the COVID-19 pandemic and unprecedented sanctions. Understanding how the tax systems of Russian regions respond to these external shocks is crucial for identifying critical stress sources affecting budgets at various levels.

Research objective. This study aims to assess and compare tax revenue stress across the federal districts of the Russian Federation, considering different levels of the budget system, and to identify the underlying sources of this stress.

Data and methods. The study relies on official data from the Federal Tax Service of the Russian Federation on tax revenues to federal and regional budgets in the federal districts. The analysis covers monthly data from January 2013 to December 2022. The stress index was calculated by measuring the difference between the moving standard deviation and the mean of the annual tax revenue growth rate, with a lag of 1 month. The methodology for decomposing the sources of tax revenue stress was also tested.

Results. Over-time assessments of stress indices for tax revenues to federal and regional budgets were obtained for the Russian Federation and its federal districts. The varying levels, dynamics, and budgetary distribution of tax revenue stress across federal districts are explained by differences in the structure, growth rates, and volatility of various taxes, as well as their correlations in these districts. Decomposition of federal and regional tax stress showed the unique role of mineral extraction tax and profit tax as stress amplifiers during crises, while in stable periods, they contribute significantly to stress reduction. The study also establishes the distinct roles of federal districts in intensifying or alleviating overall tax revenue stress during pandemic and sanctions shocks, as well as periods of relative stability.

Conclusions. This research demonstrates the importance of assessing and identifying sources of tax revenue stress in regions. Such insights help identify vulnerabilities and reserves for enhancing the resilience of regional and federal budgets through the diversification of regional economic systems and adjustments to tax system rules in response to changing external conditions.

KEYWORDS

Stress index, tax revenues, tax system, federal budget, regional budgets, decomposition, economic crisis, pandemic, sanctions, federal districts

FOR CITATION

Malkina, M. Yu., Balakin, R. V. (2023). Assessment of the level and structure of stress in tax revenues of the federal and regional budgets. *R-Economy*, 9(4), 405–421. doi: 10.15826/recon.2023.9.4.025

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Оценка уровня и структуры стресса налоговых поступлений федерального и региональных бюджетов

Актуальность. Российская экономика за последние несколько лет пережила кризис пандемии COVID-19, беспрецедентные санкции. Исследование реакции налоговых систем российских регионов на внешние шоки позволяет отследить наиболее важные источники стресса бюджетов разных уровней.

Цель. Оценка и сравнение стресса налоговых поступлений в федераль-

КЛЮЧЕВЫЕ СЛОВА

индекс стресса, налоговые поступления, налоговая система, федеральный бюджет,

ных округах РФ для разных уровней бюджетной системы и выявление его источников.

Данные и методы. Использовались официальные данные ФНС РФ о поступлениях по разным налогам в федеральный и региональные бюджеты в федеральных округах России в ежемесячном выражении с января 2013 года по декабрь 2022 года. Индекс стресса определялся как разница скользящего стандартного отклонения и среднего значения темпа прироста годовых налоговых поступлений с лагом в 1 месяц. Апробирована методика декомпозиции индекса стресса налоговых поступлений по источникам.

Результаты. Получены динамические оценки индексов стресса налоговых поступлений в федеральный и региональный бюджеты для РФ и ее федеральных округов. Разные уровень, динамика и бюджетное распределение стресса налоговых поступлений в федеральных округах объяснены разной структурой налоговых поступлений, темпами роста, волатильностью и корреляцией разных налогов в этих округах. Выявлена особая роль НДС и налога на прибыль как усилителей стресса для ряда федеральных округов в периоды кризисов, в то время как в стабильные периоды они значительно способствуют его снижению. Также установлена разная роль федеральных округов в усилении и снижении общего стресса налоговых поступлений в бюджеты разных уровней в периоды воздействия пандемического и санкционного шока и периоды относительной стабильности.

Выводы. Адекватная оценка и идентификация источников стресса налоговых поступлений в регионах позволяет находить уязвимые точки и резервы роста устойчивости регионального и федерального бюджета путем диверсификации региональных экономических систем и адаптации правил налоговой системы к меняющимся условиям внешней среды.

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региональные бюджеты, декомпозиция, экономический кризис, пандемия, санкции, федеральные округа

ДЛЯ ЦИТИРОВАНИЯ

Малкина, М. Ю., Балакин, Р. В. (2023). Оценка уровня и структуры стресса налоговых поступлений федерального и региональных бюджетов. *R-Economy*, 9(4), 405–421. doi: 10.15826/recon.2023.9.4.025

联邦和地区预算税收压力水平和结构估算

现实性: 俄罗斯经济在过去几年中经历了 COVID-19 和前所未有的制裁。通过研究俄罗斯各地区税收制度对外部冲击的反应, 我们可以追踪各级预算压力的最重要来源。

研究目标: 评估和比较俄罗斯联邦各联邦区各级预算系统的税收压力并确定其来源。

数据与方法: 文章使用的是俄罗斯联邦税务局 2013 年 1 月至 2022 年 12 月俄罗斯各联邦和地区预算系统中各种税收收入的官方数据。压力指数被定义为滞后 1 个月的年税收收入增长率的移动标准偏差与平均值之差。另外, 按来源分解税收压力指数的方法已经通过测试。

研究结果: 文章对俄罗斯联邦及其联邦区的联邦和地区预算中的税收压力指数进行了动态估算。各联邦区税收压力的不同水平、动态和预算分布可以用这些地区不同税收的结构、增长率、波动性和相关性来解释。在危机时期, 矿产开采税和利润税对一些联邦区的压力增大起着特殊作用, 而在稳定时期, 它们则对减轻压力做出了重大贡献。此外, 文章还确定了新冠疫情和制裁冲击时期以及相对稳定时期, 以及各联邦区在增加和减少各级预算的总体税收压力时的不同作用。

结论: 文章充分评估和确定了各地区税收压力的来源。研究建议, 可以通过地区经济体系的多样化和税收制度的调整来适应外部环境条件的变化, 并为地区和联邦预算的可持续性增长找到薄弱点和增长点。

关键词

压力指数、税收收入、税收制度、联邦预算、地区预算、分解、经济危机、疫情、制裁、联邦地区

供引用

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Introduction

In the era of global economic uncertainty and interconnected markets, evaluating the system's stress resistance and its ability to withstand shocks is paramount. Above all, it is important to develop effective methodologies to measure stress levels and

comprehend the contributing factors. Analysis of stress dynamics at the regional economic level provides valuable insights into variations in resistance, adaptive capacity, and their underlying sources.

External shocks have varying impacts on different parameters of regional economies, and one

such parameter is tax revenues, which closely align with GDP. Monthly tax statistics provide a timely basis for operational analysis. Moreover, tax revenues play a substantial role in shaping both regional and national budgetary systems, influencing their capacity to deliver public goods, finance investment projects, and determine the potential for subsequent regional economic development.

This study focuses on tax revenues in Russian federal districts (macro-regions) and the entire country. More specifically, it examines the stress levels of tax revenues in these federal districts and their distribution between different levels of the budget system (federal and regional budgets).

This study aims to evaluate and compare the stress levels of tax revenues across federal districts for both federal and regional budgets over different periods: pre-pandemic, pandemic, recovery, and new sanctions. The objectives include the following: developing approaches for assessing and decomposing the stress of tax revenues in regions; evaluating the stress of tax revenues from federal districts to both the federal and regional budgets, and identifying their sources; decomposing the stress of tax revenues to different levels of budgets by taxes in various periods, and by federal districts in different periods; and, finally, identifying factors contributing to the sustainable development and risks of tax revenues in federal districts, along with providing general recommendations to enhance the resilience of regional tax systems to new shocks.

The study's hypothesis is that the stress experienced by regions in their tax revenues, across different budget levels, is contingent on factors such as structural composition, growth rates, volatility of revenues from diverse taxes, and interconnectedness. The effective management of stress involves optimizing the diversification of tax portfolios in regions.

The subsequent article is structured as follows. The “Theoretical Framework” section provides an overview of relevant literature, covering topics such as stress measurement in the economy, the resilience of regional economies to new shocks, and the operation of regional tax systems in Russia and globally amid global turbulence. The section “Data and Methods” describes the databases employed and elucidates our methodology for calculating the tax revenue stress index, including its decomposition by sources. The “Results” section deals with the dynamic estimates of

tax revenue stress in federal districts, spanning various budget levels, and conducts an in-depth analysis of the sources of tax revenue stress over time. Finally, the “Conclusions” section presents the study's findings, offering both theoretical and practical recommendations. Additionally, it describes the study's limitations and proposes avenues for future research.

Theoretical framework

Assessment of economic systems' exposure to stress and their responses to this gained prominence in the banking sector, notably in a study by the European Central Bank (Hollo et al., 2012). This study constructed an overall stress index using portfolio theory, aggregating five market sub-indices based on 15 individual financial stress indicators while considering time-varying cross-correlations between these sub-indices.

Continuing this line of research, Kremer (2016) compared approaches to measuring financial stress. Another notable work by specialists from the International Monetary Fund (Balakrishnan et al., 2009) proposed an overall stress index based on four market price indicators and a stock market pressure index. Each component was pre-normalized using the equivalent variance method, providing the advantage of insulating significant fluctuations in one component from affecting the overall index. The additive function facilitated the decomposition of contributions into sub-indices.

In the Russian context, Stolbov (2019), Fedorova (2015), and Ekimova (2017) systematically addressed approaches to measuring stress experienced by economic systems and attempted to construct indices using Russian economic data. An interesting contribution comes from Smirnov & Smirnov (2022), who developed a methodology for the daily Index of Economic Stress, incorporating indicators from financial, commodity, real, banking, and consumer sectors. This Economic Stress Index demonstrated the ability to generate “alarm signals” during recessions in 1998, 2008–2009, 2015–2016, and the 2020 coronacrisis.

Additionally, Malkina & Balakin (2023) provided analysis of theoretical and methodological concepts and proposed novel approaches to assess industrial and financial stress in the Russian economy.

Stress indices primarily aim to forecast and identify economic crises, impacting various in-

dicators, including taxes. The sensitivity of taxes to different crises is an important area of study for economists globally, with notable research by Gnanon (2022) confirming the influence of tax revenue instability on GDP in both developed and developing countries based on an analysis of 146 countries from 1981–2016.

Interest in this research has surged since the 2020 pandemic. For instance, an OECD survey explores the impact of tax and fiscal policies on pandemic mitigation and economic recovery, outlining key policy reforms necessary for restoring public finances.

An earlier study by the International Monetary Fund (Brondolo, 2009) underscores the crucial role of expanding taxpayer assistance, focusing policies on emerging risks, introducing legislative reforms for tax administration, and enhancing communication programs to boost tax collection during crises.

Russian researchers also contribute to understanding the impact of different crises on tax revenues. Gurvich & Suslina (2015) highlight the sensitivity of individual tax collection to macroeconomic shocks and tax policy decisions. This sensitivity poses an additional risk to the budget system's revenues, and a decline in tax collection during a crisis can exacerbate the negative effects of reduced tax bases and structural shifts. Pogorletskiy & Pokrovskaya (2021), drawing on the consequences of the COVID-19 pandemic and crisis recovery experience, advocate for the core principles of modern fiscal policy, emphasizing a clear social orientation, government withdrawal of excess revenues during the pandemic, and alignment with the recovery strategies of other countries in the post-crisis period.

In many studies, the exploration of tax revenue sensitivity during different crises often revolves around forecasting (e.g., Kostina & Mashentseva, 2019). Some works specifically examine the tax response to pandemics. For instance, Kaulina (2021) forecasts a decline in personal income tax revenues in the consolidated budgets of Russian regions from 2020–2023 due to the COVID-19 pandemic. The author identifies three factors contributing to the decrease: the overall economic impact of the pandemic, the revenue base's crisis sensitivity, and the regional tax revenues' sensitivity to changes in the revenue base. Lykova (2020) observes a rise in excise tax revenues in Russia during the pandemic and as-

sociated economic crisis, attributed to rate hikes on certain excisable goods and an increase in their budgetary contributions.

In the context of our study, works exploring the resilience of regional systems and its determining factors are particularly intriguing. Various approaches exist for assessing the resilience of regional tax systems. For example, Nerudova et al. (2019) employ a multidimensional approach to socio-economic sustainability, encompassing the needs of society in the sustainable development of the economy, society, environment, and institutions.

Several authors emphasize the significance of the tax system and fiscal policy in shaping a stable economic system (e.g., Mutascu et al., 2011). Goswami et al. (2021) examine the impact of the COVID-19 pandemic on regional macroeconomic performance in Indian states. Their analysis reveals that states with high COVID-19 prevalence, unfavorable initial economic conditions, and a higher proportion of employment in the secondary and tertiary sectors suffered more significant economic losses. In contrast, states with effective containment strategies, better healthcare capacity, and a higher proportion of primary sector employment experienced smaller economic losses.

Russian researchers, including Troyanskaya & Vylkova (2019), concentrate on fiscal sustainability indicators to evaluate municipalities' capacity to secure stable development of a region through consistent tax and fee revenues. Tsepelev & Kaulina (2014) argue that unpredictable, sharp fluctuations in the tax burden can destabilize the economy and impede economic growth.

Mikheeva (2021) points out the regional component as a significant factor determining resilience. Klimanov & Kazakova (2021) note the challenges in Russia's transition to sustainable development due to high interregional differentiation and limitations in regional strategic planning. Meanwhile, Zhikharevich et al. (2021) identify a paradox in Russia, where subsidization and a backward economic structure are factors that increase resilience.

Several studies examine the resilience of specific macro-regions (federal districts of the Russian Federation) to external shocks. For instance, Mitrofanova et al. (2021) analyze industrial regions in southern Russia, demonstrating that the development prospects of the regional industri-

al complex depend on the balance between state regulation and market self-regulation, and are influenced by the accumulated potential of the regional industry and available adaptive capabilities. Their subsequent study (Mitrofanova et al., 2022) supports the idea that advanced development is characteristic of regions with a high level of socio-economic potential and a diversified economy.

Minakir & Naiden (2021) attribute failures in stabilizing demographic potential and developing the social system of the Far Eastern regions of Russia to the misalignment of state policy, indicating the incapacity of the institutional paradigm to achieve the set goals. Kolomak (2020) explains significant differences in the response of Russian regional economies to the pandemic by factors such as the speed of the virus's spread, implemented restrictive measures, and regional development peculiarities before the crisis.

Kuznetsova (2021) identifies factors contributing to regional resilience during the pandemic, including the degree of diversification of regional economies, their innovation potential, and economic specialization. Turgel et al. (2021) highlight the greater vulnerability of regions with a high urban population and developed small and medium-sized businesses in the acute phase of the pandemic. Regional responses to the crisis depend on the severity of measures restricting business and social activities, as well as the extent of regional differentiation in economic support measures. Additionally, the introduction of digital technologies, new delivery methods, and orientation toward new market segments prove crucial in stabilizing aggregate supply and demand.

Malkina (2022) provides evidence that the share of employees in the public sector positively impacts the resilience of regional economies during the pandemic, while the degree of openness and the scale of the economy, along with the share of the extractive industry, have a negative impact.

While the response of Russian regions to the COVID-19 pandemic has been extensively studied, there has been limited research on their resilience to the recent sanctions. For instance, Stepanov et al. (2022) analyze Sverdlovsk region, with a high concentration of mining and manufacturing enterprises, revealing the complex impact of international economic sanctions on the trajectory and dynamics of the Russian industrial sec-

tor. Akberdina (2022) explores the Greater Urals, encompassing industrial, resource, resource-industrial, and agrarian-industrial regions, demonstrating that resilience factors effective in the first wave of sanctions (2014–2015) proved insufficient to overcome the crisis caused by the sanctions in 2022.

Building on these works and expanding our earlier research (Malkina & Balakin, 2022), this study introduces new approaches to investigating the tax system's resilience, focusing on tax revenue. We analyze the dynamics and structure of the tax system stress index in the Russian Federation in the pre-pandemic, pandemic, and recovery periods. The study extends the tax stress analysis to macro-regions (federal districts), explores the distribution of tax revenue stress across budget system levels, and covers a more relevant period, reflecting the impact of the new sanctions on Russian regions.

Data and methods

The study relies on the official data from the country's Federal Tax Service, covering tax revenues on a monthly basis from January 2013 to December 2022¹.

The data encompassed a range of tax types and fees administered by the Federal Tax Service, including profit tax, personal income tax, value-added tax, excise taxes, state duty, natural taxes (such as the mineral extraction tax and royalties), property taxes (including personal and corporate property taxes, transport tax, tax on gambling business, and land tax), and special tax regimes (unified agricultural tax, unified tax on imputed income, and the simplified taxation system, among others).

The methodology for calculating and decomposing the tax system stress index, proposed in our previous article (Malkina & Balakin, 2022), was adapted for assessing the stress of tax revenues in the federal districts of Russia. This adaptation includes the distribution of stress between federal and regional budgets, as well as a decomposition of stress by taxes and federal districts in this study.

¹ Report on accrual and receipt of taxes, fees, insurance contributions and other mandatory payments to the budget system of the Russian Federation // URL: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access 17.07.2022)

The methodology includes the following steps:

1. Calculation of moving growth rates of annual tax revenues from k -tax (or from all taxes) in the i -district (country) in the j -month with a step of 1 month which allows to cope with the problems of seasonality and different frequency of tax revenues:

$$t_{kij} = \frac{T_{kij}}{T_{kij-12}} - 1, \tag{1}$$

where $T_{kij} = \sum_{j=j-11}^j T_{kij}$ is the volume of revenues from the k -tax in the i -district for 12 consecutive months ending with the j -month; $T_{kij-12} = \sum_{j=j-23}^{j-12} T_{kij}$ is the volume of revenues from the k -th tax in the i -th district for 12 consecutive months ending in month $j-12$;

2. Calculation of the moving average growth rate of k -tax revenues in i -district for 12 consecutive months, ending with the j -month:

$$\tau_{kij} = \frac{\sum_{j=j-11}^j t_{kij}}{12}. \tag{2}$$

3. Determination of the moving standard deviation of the growth rate for 12 consecutive months ending at j -month:

$$\sigma_{kij} = \sqrt{\frac{\sum_{j=j-11}^j (t_{kij} - \tau_{kij})^2}{12}}. \tag{3}$$

4. Calculation of stress index of revenues from k -tax in i -district:

$$SI_{kij} = \sigma_{kij} - \tau_{kij}. \tag{4}$$

In this approach, the stress of tax revenues increases with lower growth rates and higher volatility. The suggested stress index serves as an alternative to the coefficient of variation, which is unsuitable for assessing the variation in growth rates of indicators. Furthermore, the stress index resembles the simplest anti-utility function, akin to the Arrow-Pratt function.

5. Decomposition of the tax revenue stress index in i -district (country) by sources (taxes and tax groups).

5.1. Decomposition of the growth rate of tax revenues by K taxes:

$$t_{ij} = \sum_{k=1}^K t_{kij} \cdot \alpha_{kij-12}, \tag{5}$$

where $\alpha_{kij-12} = \frac{T_{kij-12}}{T_{i,j-12}}$ is a share of k -tax (tax group)

in total tax revenues a year ago, and $\sum_{k=1}^K \alpha_{kij-12} = 1$.

Contribution of k -tax to the growth rate of total tax revenues:

$$t_{ij}(k) = t_{kij} \cdot \alpha_{kij-12}. \tag{6}$$

Similarly, the contribution of k -tax to the average growth rate of tax revenues:

$$\tau_{ij}(k) = \tau_{kij} \cdot \alpha_{kij-12}. \tag{7}$$

5.2. Decomposition of the standard deviation of the growth rate of tax revenues by K taxes:

$$\sigma_{ij} = \frac{\sum_{k=1}^K CoVar(t_{ij}; t_{kij} \cdot \alpha_{kij-12})}{\sigma_{ij}}, \tag{8}$$

where $\sum_{k=1}^K CoVar(t_{ij}; t_{kij} \cdot \alpha_{kij-12}) = CoVar(t_{ij}; t_{ij}) = Var(t_{ij})$ is decomposed variance of the growth rate of tax revenues.

The contribution of each tax to the standard deviation of the growth rate of tax revenues:

$$\sigma_{ij}(k) = \frac{CoVar(t_{ij}; t_{kij} \cdot \alpha_{kij-12})}{\sigma_{ij}}. \tag{9}$$

5.3. General decomposition of the tax revenue stress index by sources:

$$SI_{ij} = \sigma_{ij} - \tau_{ij} = \sum_{k=1}^K (\sigma_{ij}(k) - \tau_{ij}(k)). \tag{10}$$

Similarly, the decomposition of the country's tax revenue stress index by federal districts follows a comparable approach.

The devised methodology facilitates the identification of each tax and district's contribution to the overall stress of tax revenues for both federal and regional budgets in various periods. Its implementation enables us to discern the impact of specific taxes and federal districts on the increase or decrease of tax revenue stress in budgets of different levels during turbulent and relatively calm periods. Furthermore, it allows for the identification of unique sources and mitigating factors influencing tax revenue stress in each of the 8 federal districts of the Russian Federation.

Results

The dynamic values of the stress of the country's total tax revenues to the federal and regional

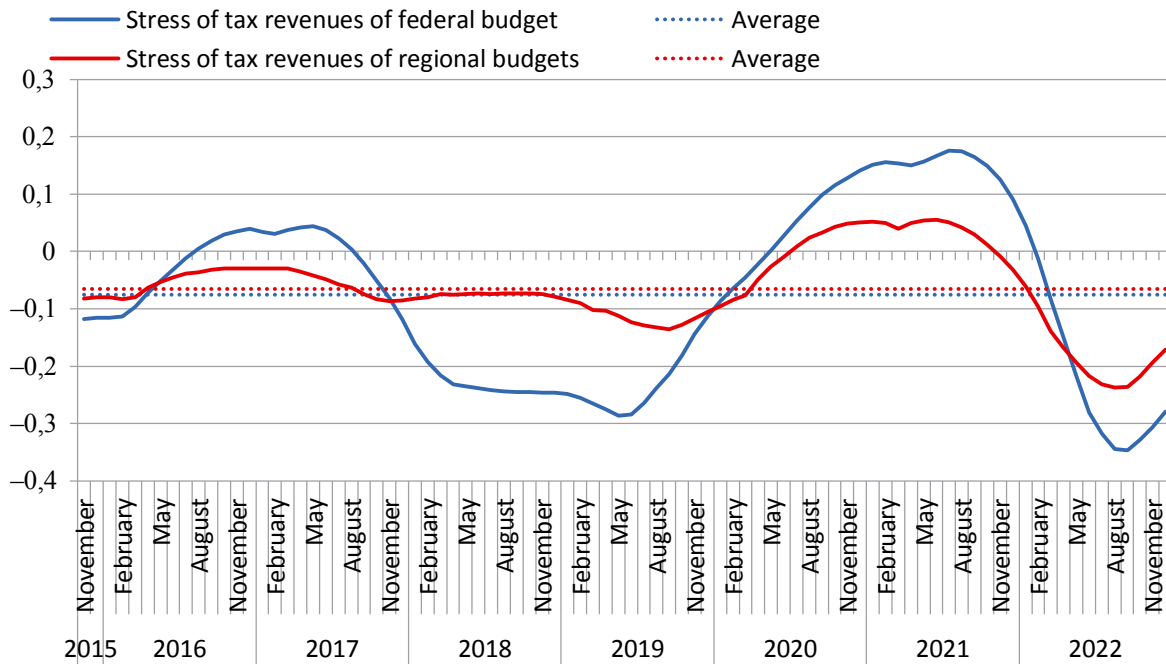


Figure 1: Stress of tax revenues of federal and regional budgets in the Russian Federation

Source: the authors' calculations are based on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access: 17.07.2023)

budgets, calculated based on formulas (1–4), are depicted in Figure 1, while those for federal districts are illustrated in Figure 2. In all figures, the solid blue curve represents the stress of the federal budget, the blue dotted line denotes the average stress of revenues to the federal budget throughout the observed period, the solid red curve indicates the stress of regional budgets, and the red dotted line signifies the average stress for regional budgets.

Our analysis has shown that the average stress level for revenues allocated to regional budgets is consistently higher throughout the entire period compared to revenues to the federal budget. This pattern holds true for both the country as a whole and the majority of federal districts. The Southern Federal District stands out with the highest excess of regional stress over federal stress (4.42 percentage points), followed by the Volga Federal District (3.16 points). The Central Federal District and the Far Eastern Federal District exhibit lower stress levels for tax revenues to regional budgets than for the federal budget. The Central Federal District has a notable difference of 1.26 points.

The Far Eastern Federal District stands out for having the maximum average stress level for tax revenues in both the federal and regional bud-

gets among all districts. The excess stress over the average Russian level is significant, amounting to 7.89 points for the federal budget and 6.63 points for regional budgets. The Urals Federal District rates second in terms of stress levels for tax revenues to the federal and regional budgets, with an excess over the average Russian level of 2.77 points for the federal budget and 3.23 points for regional budgets.

The Southern Federal District exhibits the lowest average stress level for tax revenues to the federal budget, with 4.07 points below the national average. Additionally, the stress for revenues to the federal budget is notably lower than the national average in the Volga Federal District (–0.77 points). The Central Federal District has the lowest level of stress for regional budgets, standing –1.3 points compared to the value for the whole country. It is also below the national average in the North-Western Federal District and Southern Federal District.

Examining the variability of stress values over time adds an interesting dimension. As per the standard deviation, the stress of tax revenues to the federal budget is most volatile in the Far Eastern Federal District ($s = 0.347$), closely followed by the Urals Federal District ($s = 0.258$). The Cen-

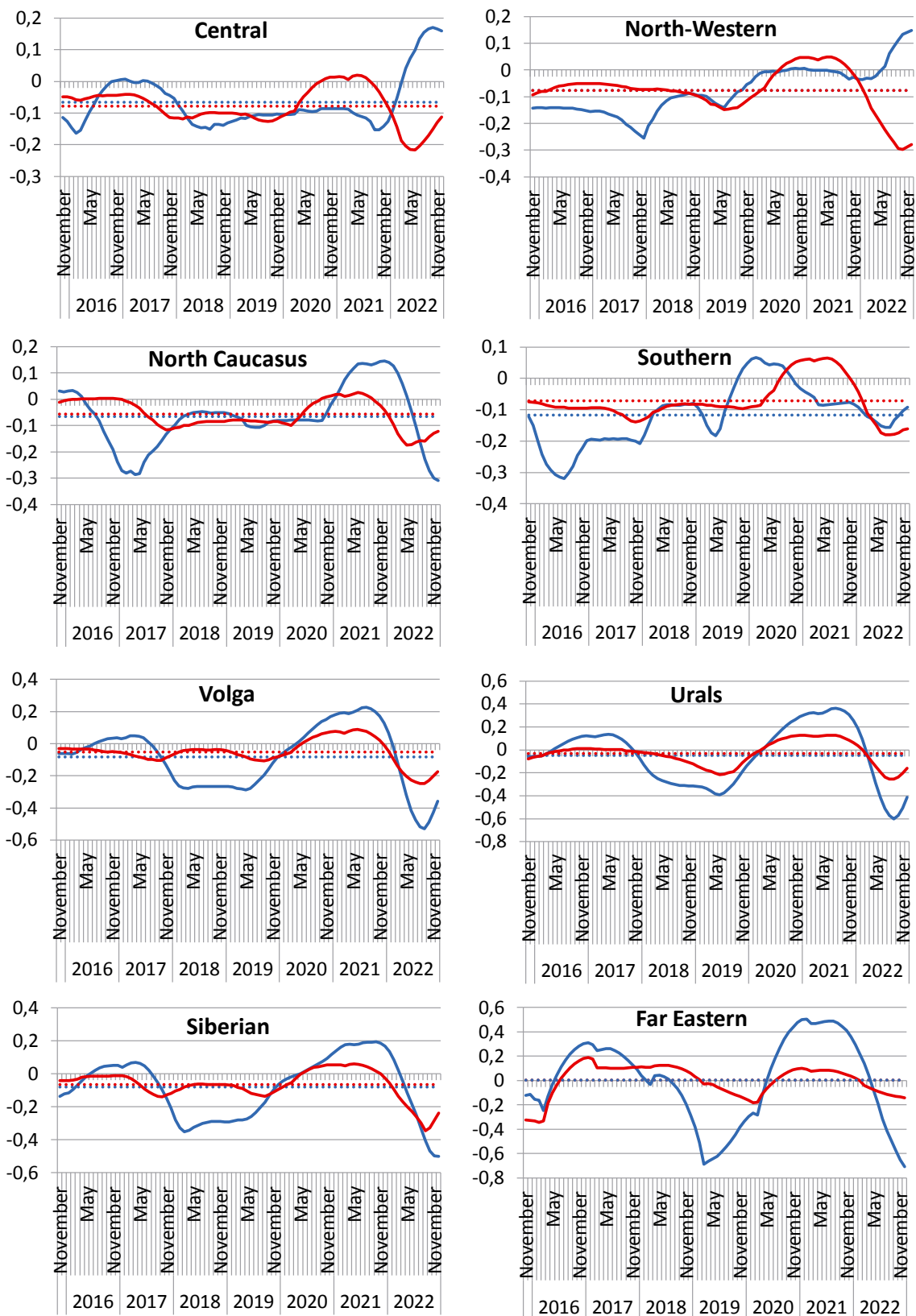


Figure 2. Stress of tax revenues of federal and regional budgets in the federal districts of the Russian Federation

Source: the authors' calculations are based on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access: 17.07.2023)

tral Federal District ($s = 0.082$) and the North-western Federal District ($s = 0.088$) exhibit the most stable tax revenues.

A slightly different scenario unfolds for regional budget revenues. The instability of the stress level varies from $s = 0.055$ in the North Caucasus Federal District and $= 0.057$ in the Central Federal District to $s = 0.106$ in the Urals Federal District and $s = 0.128$ in the Far Eastern Federal District. At the national level, the variation of stress is higher at the federal level ($s = 0.155$) compared to the regional level ($s = 0.071$), aligning with our earlier conclusion regarding a higher tax revenue risk at the federal level (Malkina & Balakin, 2016).

Furthermore, there is a similar dynamics of stress in tax revenues for federal and regional budgets. The linear correlation of stress between federal and regional levels over time is 0.87, suggesting the influence of similar macroeconomic factors. However, examining federal districts reveals a close relationship between federal and regional stress levels only in the Urals Federal District (time correlation coefficient of 0.96), the Volga Federal District (0.81), and the Siberian Feder-

al District (0.72). The Far Eastern District exhibits a correlation at 0.59, the Southern District at 0.40, and the North Caucasus District at 0.28. The Central and Northwestern Federal Districts, on the other hand, show negative correlation coefficients of federal and regional stress levels (-0.42 and -0.21 , respectively).

The disparities in the level and dynamics of tax revenue stress across federal districts and budget levels stem from various factors, including the structure of tax revenues, dynamics (growth rates and volatility) of different taxes, and the correlation of revenues. Lower stress in tax revenues is associated with a tax portfolio consisting of steadily growing taxes and optimal diversification, where revenue growth rates are least correlated. Tables 1 and 2 outline these four factors of tax revenue stress for federal and regional budgets, with cells highlighting the most significant factors in each federal district shaded in gray.

The primary stress factors affecting revenues to the federal budget of the Russian Federation vary across federal districts (see Table 1). In the Central Federal District, the increased share and relatively

Table 1
Stress factors of tax revenues from federal districts to the federal budget of the Russian Federation

RF and Federal Districts	Profit tax	VAT	Excise taxes	Natural taxes	State duty	Special regimes
α_{ki} (%)						
Russian Federation	8.8	35.6	3.0	51.8	0.2	0.5
Central	24.9	75.3	-6.8	6.2	0.3	0.0
North-Western	10.4	36.6	29.7	22.8	0.2	0.3
North Caucasus	5.4	66.3	8.0	19.7	0.5	0.0
Southern	9.6	36.7	29.0	24.4	0.3	0.0
Volga	3.4	34.2	0.8	61.4	0.1	0.0
Urals	1.9	19.2	-0.5	79.4	0.0	0.0
Siberian	5.3	34.0	3.3	57.3	0.1	0.0
Far Eastern	31.8	-6.8	2.8	54.2	0.3	17.7
τ_{kij} (%)						
Russian Federation	22.0	14.1	-16.6	22.2	0.5	25.6
Central	21.0	14.1	-244.8	831.2	1.7	1084.5
North-Western	26.2	8.0	10.5	29.3	-0.2	9.9
North Caucasus	28.8	21.4	-10.1	14.3	4.0	-
Southern	36.4	23.0	11.3	27.4	1.8	-
Volga	20.7	17.4	27.1	26.9	-0.7	-
Urals	22.6	17.0	49.3	18.7	-0.8	-
Siberian	30.3	15.4	22.5	22.7	-1.0	-
Far Eastern	33.4	142.5	19.1	30.2	-0.3	27.0

Table 1

RF and Federal Districts	Profit tax	VAT	Excise taxes	Natural taxes	State duty	Special regimes
σ_{ki} (%)						
Russian Federation	10.7	3.5	58.5	15.6	2.5	34.0
Central	11.2	4.8	677.5	644.4	3.1	2929.3
North-Western	12.3	8.6	13.4	21.0	2.9	17.8
North Caucasus	15.3	12.3	29.9	17.6	5.8	–
Southern	17.8	11.7	14.9	11.5	3.5	–
Volga	14.2	5.1	170.8	18.6	2.5	–
Urals	18.3	10.0	1585.3	14.4	2.7	–
Siberian	15.7	6.7	36.2	16.7	2.2	–
Far Eastern	33.0	671.1	25.7	16.2	2.1	35.4
r_{ki}						
Russian Federation	0.932	0.833	–0.603	0.954	0.165	0.769
Central	0.000	0.339	–0.189	–0.600	0.077	–0.666
North-Western	–0.276	0.700	0.644	–0.274	0.500	–0.112
North Caucasus	–0.160	0.776	0.746	0.246	0.534	–
Southern	0.073	0.550	0.424	0.623	0.827	–
Volga	0.917	0.908	–0.445	0.977	–0.005	–
Urals	0.697	0.979	0.478	0.999	0.017	–
Siberian	0.915	0.585	0.212	0.951	0.067	–
Far Eastern	0.721	0.452	–0.117	0.889	0.391	0.884

Note. Calculated on the basis of data for the whole period under consideration: from January 2013 to December 2022. Denotations: α_{ki} is average share of k-tax in total tax revenues in the federal budget in the i-district in the period under consideration; τ_{kij} is average growth rate of k-tax in the i-district; σ_{ki} is average standard deviation of the growth rate of k-tax in the i-district; r_{ki} is correlation of the growth rate of k-tax with the growth rate of total tax revenues in the i-district.

Source: the authors' calculations are based on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access: 17.07.2023)

higher volatility of profit tax and VAT are significant stress contributors, although the lack of correlation between the growth rates of the profit tax and other taxes helps alleviate this stress. In the North-Western Federal District, VAT emerges as the main stress factor due to its substantial share in revenues, lower-than-average rates, positive correlation with the growth rates of other taxes, and increased volatility. Excise tax revenues, however, mitigate the overall stress of tax revenues from the North-Western Federal District to the federal budget.

In the North Caucasus Federal District, VAT remains a primary source of stress, but its revenues grow at a higher rate than the national average, thus dampening the overall stress of tax revenues. Similarly, in the Southern Federal District, the situation mirrors that of the North Caucasus Federal District. However, in addition to VAT, excise duties also play a damping role, similar to the North-Western Federal District.

In the Volga, Urals, Siberian, and Far Eastern Federal Districts, the stress on tax revenues to the federal budget is primarily driven by natural taxes, specifically the Mineral Extraction Tax (MET). Additionally, in all four districts, the MET rates exhibit significant correlation with the growth rates of other taxes. Given that the growth rates of the MET show a positive relationship with their standard deviation, it further amplifies the stress on tax revenues. The Far Eastern Federal District shows the most favorable correlation between MET growth rates and their volatility, while the Urals Federal District demonstrates the least favorable correlation. In the Far Eastern Federal District, profit tax also contributes significantly to the stress on tax revenues to the federal budget. As the second most important tax in this district's revenue structure, it exhibits increased growth rates, heightened volatility, and a substantial relationship with other taxes.

Table 2

Stress factors of tax revenues to territorial budgets of federal districts

RF and Federal Districts	Profit tax	Personal income tax	Excise taxes	Property tax	Natural tax	State duty	Special regimes
α_{ki} (%)							
Russian Federation	31.8	39.7	7.6	13.6	0.8	0.2	6.2
Central	32.6	44.6	5.1	11.9	0.1	0.2	5.6
North-Western	33.3	41.9	4.2	13.6	0.6	0.2	6.2
North Caucasus	18.9	50.2	5.0	17.5	0.1	0.5	7.8
Southern	24.7	39.7	8.6	17.2	0.2	0.4	9.3
Volga	28.1	34.0	18.6	13.2	0.2	0.3	5.5
Urals	38.8	34.6	2.2	19.9	0.5	0.2	3.8
Siberian	32.5	34.6	12.8	11.7	2.5	0.3	5.5
Far Eastern	30.8	36.2	3.8	12.3	5.4	0.2	11.4
τ_{ki} (%)							
Russian Federation	13.7	8.9	10.5	6.4	12.6	6.4	12.2
Central	13.4	10.5	10.3	6.7	13.0	6.1	17.2
North-Western	16.5	9.6	7.3	6.7	14.2	7.6	14.7
North Caucasus	15.5	7.4	5.5	8.8	6.8	8.1	13.2
Southern	12.8	8.8	11.0	7.3	15.7	9.1	15.8
Volga	13.4	6.8	13.2	4.7	9.4	5.6	12.8
Urals	14.9	7.1	3.5	6.7	16.2	7.4	11.2
Siberian	21.3	7.4	9.0	4.2	15.7	5.4	13.2
Far Eastern	9.0	7.8	12.9	9.6	12.1	4.6	3.4
σ_{ki} (%)							
Russian Federation	8.5	1.4	5.3	4.0	6.2	3.3	7.8
Central	7.6	1.6	5.4	4.4	9.7	3.0	4.7
North-Western	9.6	1.5	5.4	4.5	7.7	3.2	4.9
North Caucasus	13.5	2.7	20.2	4.2	7.8	4.9	4.8
Southern	8.2	2.9	5.5	4.4	9.1	3.3	4.8
Volga	10.1	1.5	7.3	4.0	3.7	3.6	4.1
Urals	15.3	1.5	10.6	5.6	17.4	3.3	4.2
Siberian	12.5	1.9	5.8	4.6	4.4	4.5	4.2
Far Eastern	12.3	1.4	8.1	4.8	10.0	4.7	22.7
r_{ki} (%)							
Russian Federation	0.995	0.871	0.162	0.510	0.351	-0.073	0.835
Central	0.979	0.880	0.102	0.498	0.649	-0.350	0.969
North-Western	0.986	0.815	0.795	0.477	0.487	0.036	0.912
North Caucasus	0.929	0.495	-0.274	0.361	0.147	-0.373	0.762
Southern	0.928	0.669	-0.027	0.587	0.905	0.027	0.774
Volga	0.981	0.830	0.461	0.539	0.548	-0.320	0.840
Urals	0.989	0.809	-0.221	0.406	-0.607	-0.194	0.808
Siberian	0.985	0.689	0.351	0.637	0.526	-0.189	0.831
Far Eastern	0.971	0.059	-0.100	0.207	0.712	0.804	0.958

Source: the authors' calculations are based on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access 17.07.2023)

Concerning revenues in the federal districts to regional budgets, their stress predominantly depends on two taxes – the personal income tax (PIT) and profit tax. In most districts, they are closely correlated with other taxes. The profit tax exhibits a higher growth rate than the PIT, with the PIT displaying a more stable growth rate. The most favorable situation for the profit tax (in terms of the ratio of tax growth rates and their volatility) is observed in the Central Federal District, while the least favorable is in the Far Eastern Federal District. The PIT plays a significant role in mitigating stress across all regions, and its impact is particularly noticeable in the Central and North-Western Federal Districts.

Excises are the third most important source of tax revenues in the Volga and Siberian Federal Districts. In the Siberian Federal District, their rates are weakly negatively correlated with the growth rates of other taxes, reducing overall stress. In the Volga Federal District, excise taxes grow at a rate higher than the national average, and their correlation with volatility is noteworthy. Property taxes contribute significantly to region-

al budget revenues in the North Caucasus, Southern, and Urals Federal Districts. The North Caucasus Federal District exhibits the greatest contribution to reducing the stress of the tax system based on a combination of characteristics. Finally, tax revenues under special regimes (apparently, in terms of production sharing agreements) are a significant stress factor in the Far Eastern Federal District.

The structure of tax revenue stress in federal districts can vary significantly over time. Based on the turning points in the dynamics of overall stress (Fig. 1), we have identified four sub-periods in the study period (11.2015–12.2022): 1) pre-pandemic (11.2015–03.2020); 2) pandemic (04.2020–03.2021); 3) post-pandemic (04.2021–03.2022); and 4) new sanctions (03.2022–12.2022). Figures 3 and 4 present the results of decomposition (using formulas 5–10) of the stress of tax revenues to budgets of different levels by sources — taxes.

First of all, it is striking that those taxes, which are the main stress dampers in relatively stable periods, become the main stress amplifiers in crisis periods. This applies to natural taxes

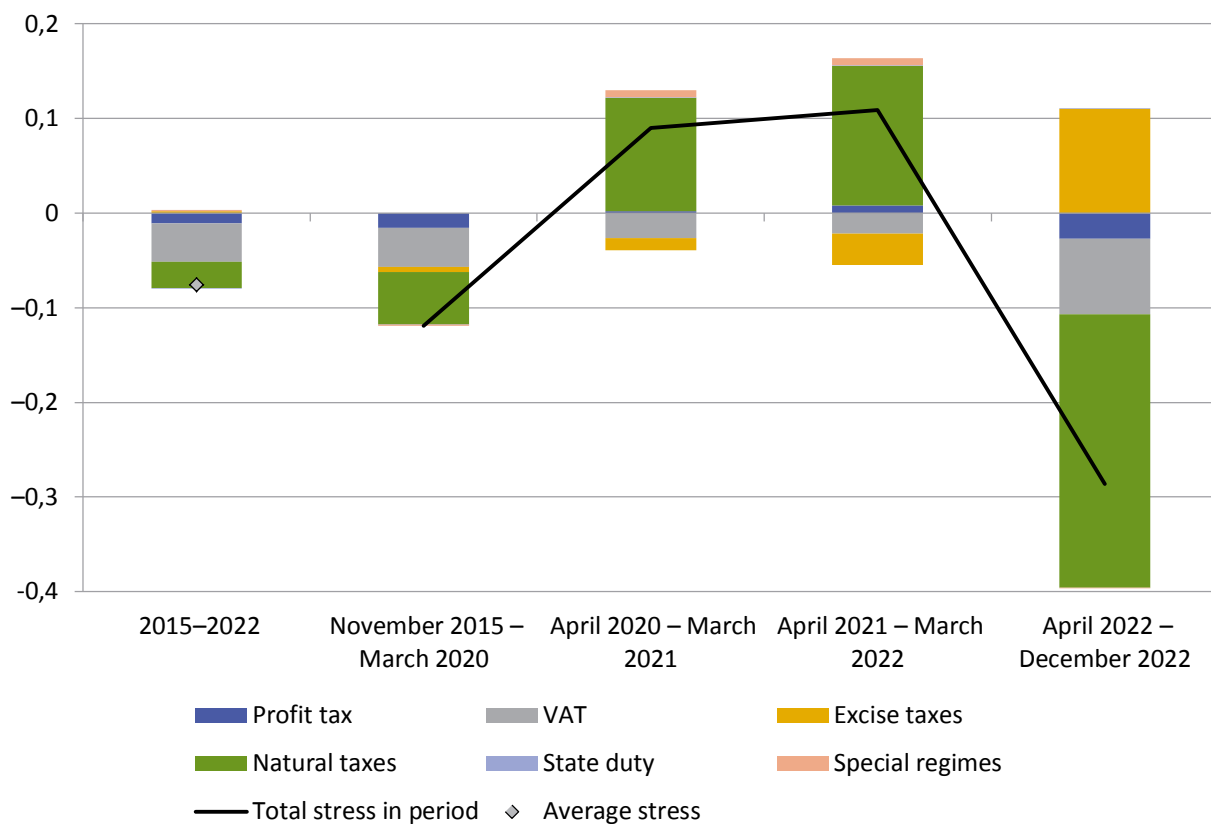


Figure 3. Decomposition of stress of tax revenues to the federal budget by taxes

Source: the authors' calculations are on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of reference 17.07.2023)

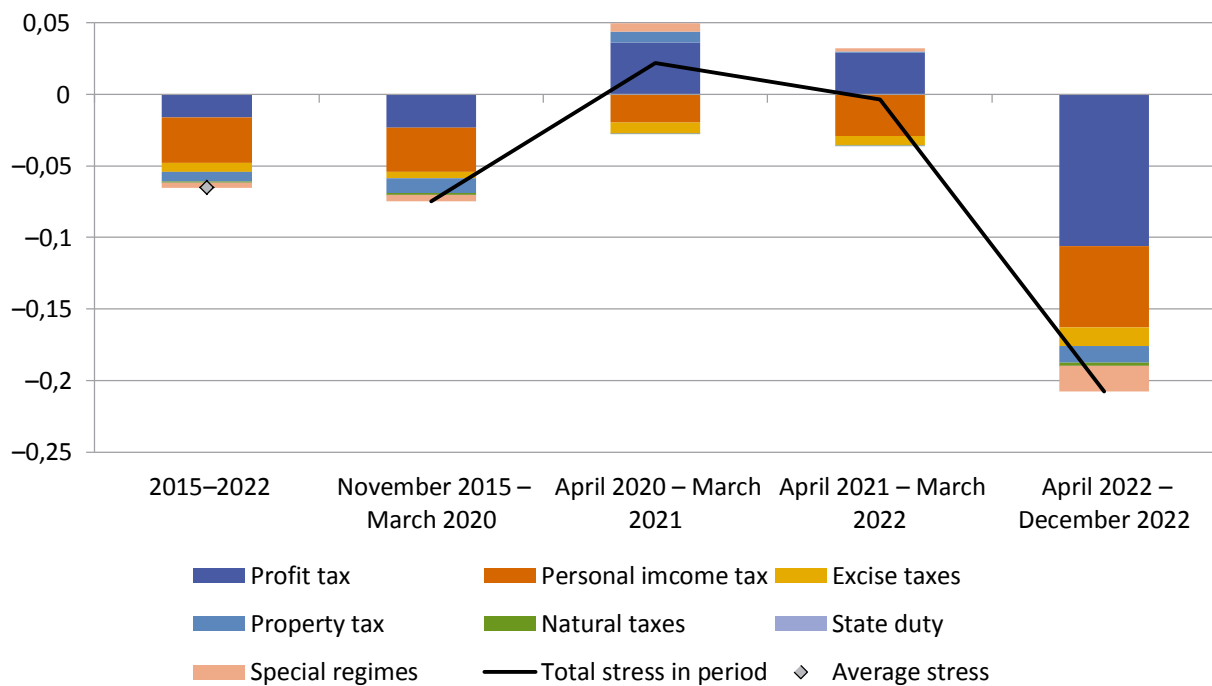


Figure 4. Decomposition of stress of tax revenues to regional budgets by taxes

Source: the authors' calculation based on Federal Tax Service statistical data. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access 17.07.2023)

for the federal budget and profit tax for regional budgets. For the federal budget, the stress of tax revenues in different periods is reduced due to the stable dynamics of VAT, while at the level of regional budgets the main stress damper is the PIT. In crisis periods, the stress of both levels slightly increases due to the instability of revenues from tax special regimes, where an important role is played by revenues from small and medium-sized businesses. Stress from property taxes received by regional budgets increased under the pandemic conditions, which is mainly due to the introduction of a number of property tax exemptions for enterprises of industries recognized as the most affected by the pandemic. Excises alleviate the overall stress on regional budgets; however, during the new sanctions period, they substantially contributed to the increase in stress on the federal budget. This is linked to the transfer of a portion of excise tax revenues to the regional level, along with an increase in tax rates. This impact not only affected the growth rate of excises but also their volatility. Finally, it should be noted that the new sanctions have not yet fully affected tax revenues, and the tax system is still undergoing changes.

Figures 5 and 6 show the decomposition of stress of tax revenues to budgets of different levels by federal districts.

The data analysis shows that during crisis periods, extractive districts, primarily the Urals Federal District and, to a lesser extent, the Volga, Far Eastern, and Siberian Federal Districts, significantly contribute to the stress on federal budget revenues. However, in more stable periods characterized by the recovery of production volumes and increased export resource prices, these same districts play a contrasting role as key stress reducers. In contrast, the Central Federal District consistently contributes to alleviating overall stress on federal budget revenues, with lesser contributions from the North-Western and Southern Federal Districts. The North Caucasus Federal District's minimal share in tax revenues (e.g., 0.49% in 2022) renders it insignificant in the context of overall stress reduction.

Regarding stress on regional budget revenues, the Central Federal District is the primary contributor to its reduction across all periods. During the crisis period, the contribution of all districts to stress reduction decreased significantly, while the Urals, Volga, and Far Eastern Federal Districts saw

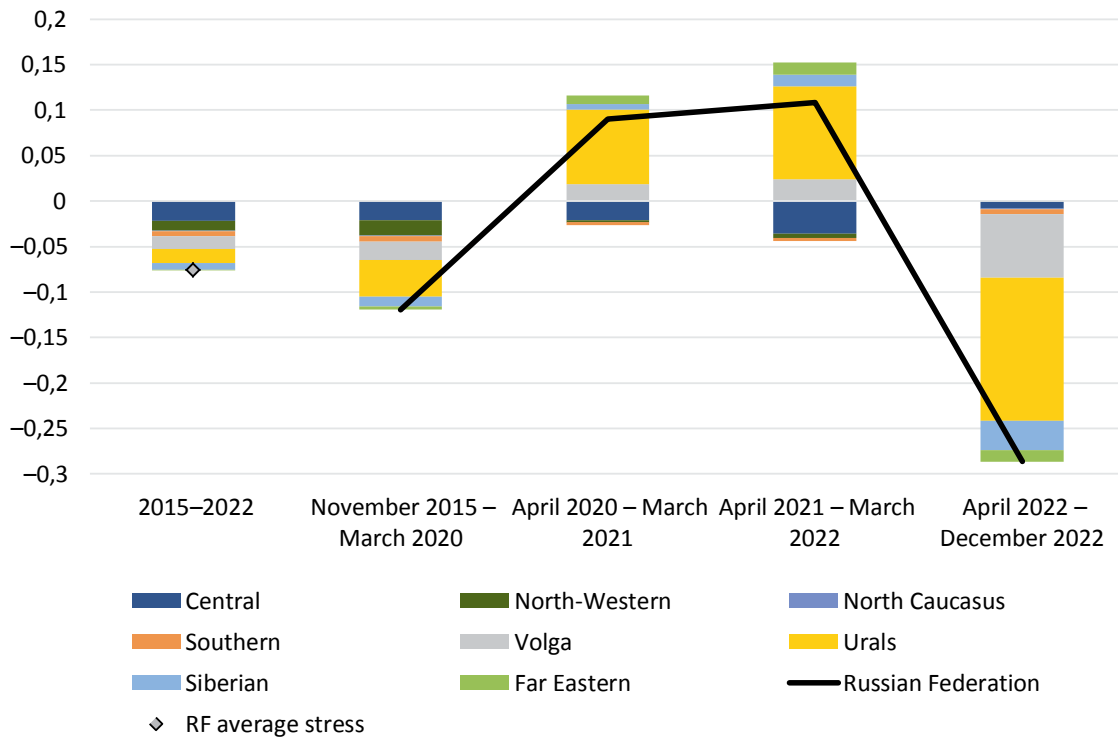


Figure 5. Decomposition of stress of tax revenues to the federal budget by federal districts

Source: the authors' calculations are based on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access 17.07.2022)

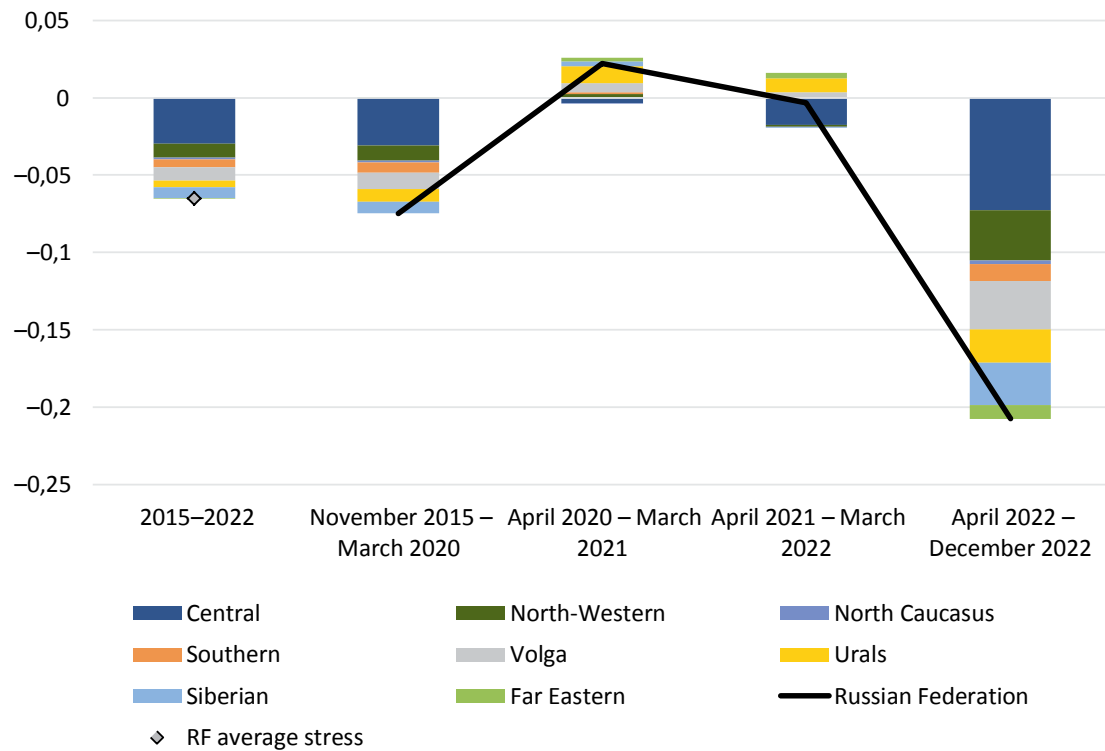


Figure 6. Decomposition of stress of tax revenues to regional budgets by federal districts

Source: the authors' calculations are based on statistical data of the Federal Tax Service. Retrieved from: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (date of access: 17.07.2022)

their contributions turn positive. Notably, in the post-sanctions period of 2022, most regions exhibited stable growth in tax revenues to regional budgets. However, in the final three months of 2022, there was a notable decrease in growth rates and increased volatility of tax revenues, showing a mild impact on overall stress (as illustrated by Figures 1 and 2).

Conclusions

Applying the proposed methodology, we calculated the dynamic estimates of tax revenue stress for both federal and regional budgets in Russia's federal districts from 2013 to 2022, along with providing a detailed breakdown by sources.

The analysis reveals that, on average, stress in tax revenues to regional budgets surpasses that of tax revenues to the federal budget, with significant variations among districts. The Far Eastern and Urals Federal Districts exhibit the highest stress levels and variability, while the Southern Federal District experiences the least stress in federal budget revenues (though its contribution is small), and the Central Federal District has the lowest stress in regional budget revenues. There is a notable positive correlation between stress values for the federal and regional budgets in Russia and some federal districts, except for weakly negative correlations in the Central and North-Western Federal Districts.

It is demonstrated that the difference in the level and dynamics of tax revenue stress in federal districts both among themselves and for different levels of the budget system is explained by

a number of factors: the structure of tax revenues, dynamics (growth rates and volatility) of different taxes and correlation of revenues in them. Proper diversification of the tax portfolio contributes to the reduction of the overall level of stress and decreases the reaction of tax revenues of the regions to external shocks.

The decomposition of tax revenues by sources showed that some highly productive taxes (natural taxes and profit tax), which are the main sources of stress for federal and regional budgets in periods of crises, become its main dampers in periods of recovery growth. A similar situation is observed in the districts (to a greater extent it concerns the Urals Federal District). At the same time, the Central Federal District remains the main stress dampener of revenues to the budgets of both levels in all periods.

These findings offer valuable insights for advancing theoretical and methodological approaches to stress measurement in tax systems. Moreover, they provide practical guidance for regional and federal authorities in managing tax revenue risks at different budget levels, identifying vulnerabilities, and proposing strategies for overall sustainability through risk distribution and enhanced tax portfolio diversification.

The study's limitation lies in its focus on internal sources of stress, without considering external factors. Future research should address this limitation by incorporating external factors into the stress assessment model for regional tax systems.

References

- Akberdina, V. V. (2022). System resilience of industry to the sanctions pressure in industrial regions: Assessment and outlook. *Journal of New Economy*, 23(4), 26–45. DOI: [10.29141/2658-5081-2022-23-4-2](https://doi.org/10.29141/2658-5081-2022-23-4-2).
- Balakrishnan, R., Danninger, S., Elekdag, S. & Tytell, I. (2009). The Transmission of Financial Stress from Advanced to Emerging Economies. *Emerging Markets Finance and Trade*, 47(5), 40–68. DOI: [10.2307/23047442](https://doi.org/10.2307/23047442)
- Brondolo, J. (2009). Collecting Taxes During An Economic Crisis: Challenges and Policy Options. *IMF staff position note (SPN/09/17)*. Retrieved from <https://www.imf.org/external/pubs/ft/spn/2009/spn0917.pdf>. DOI: 10.5089/9781462339440.004
- Ekimova, N.A. (2017). Indicators of Early Crisis Prevention: in Search of New Approaches. *Bulletin of Ural Federal University. Series Economics and Management*, 16(6), 985–1002. DOI: [10.15826/vestnik.2017.16.6.047](https://doi.org/10.15826/vestnik.2017.16.6.047) (In Russ.)
- Fedorova, E. A. (2015). Methodological approaches to building the financial sustainability index for the Russian financial market. *Finance and Credit*, 5(629), 11–20. (In Russ.)
- Ngangnon, S. K. (2022). Tax revenue instability and tax revenue in developed and developing countries. *Applied Economic Analysis*, 30(88), 18–37. DOI: [10.1108/AEA-09-2020-0133](https://doi.org/10.1108/AEA-09-2020-0133)
- Goswami B., Mandal R. & Nath H. (2021). Covid-19 pandemic and economic performances of the states in India. *Economic Analysis and Policy*, 69, 461–479. DOI: [10.1016/j.eap.2021.01.001](https://doi.org/10.1016/j.eap.2021.01.001)

Gurvich, E. & Suslina, A. (2015). Tax Collection Trends in Russia: Macroeconomic Approach. *Financial Journal*, 4(26), 22–34. (In Russ.)

Hollo, D., Kremer, M. & Duca, M. (2012). CISS - A Composite Indicator of Systemic Stress in the Financial System. *SSRN Electronic Journal*, 1(2), Retrieved from <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1426.pdf> DOI: 10.2139/ssrn.1611717

Kakaulina, M. O. (2021). Projected shortfall in personal income tax revenues of regional governments in Russia due to the COVID-19 pandemic. *Journal of Tax Reform*, 7(1), 39–54. DOI: [10.15826/jtr.2021.7.1.089](https://doi.org/10.15826/jtr.2021.7.1.089)

Klimanov V. V., Kazakova S. M. (2021). Assessment of sustainable development of Russian regions. *Area Development and Policy*, 7(14), 1–23. DOI: [10.1080/23792949.2021.1994437](https://doi.org/10.1080/23792949.2021.1994437)

Kolomak, E. A. (2020). Economic effects of pandemic-related restrictions in Russia and their spatial heterogeneity. *R-economy*, 6(3), 154–161. DOI: [10.15826/recon.2020.6.3.013](https://doi.org/10.15826/recon.2020.6.3.013)

Kostina, Z. A. & Mashentseva, G. A. (2019). Forecasting tax revenues of the budget of the subject of the Russian Federation using correlation and regression analysis. *Siberian Financial School*, 5(136), 144–147 (In Russ.)

Kremer, M. (2016). Financial stress indices: An introduction. *The Spanish Review of Financial Economics*, 14, 1–4. DOI: [10.1016/j.srfe.2016.02.001](https://doi.org/10.1016/j.srfe.2016.02.001)

Kuznetsova, O. V. (2021). Economy of Russian Regions in the Pandemic: Are Resilience Factors At Work? *Regional Research of Russia*, 11(4), 419–427. DOI: [10.1134/S2079970521040237](https://doi.org/10.1134/S2079970521040237)

Lykova, L. N. (2020). Regional budgets in 2020: income sustainability in the crisis // *Federalism*, 25(4), 200–218. DOI: [10.21686/2073-1051-2020-4-200-218](https://doi.org/10.21686/2073-1051-2020-4-200-218) (In Russ.)

Malkina, M. Yu. & Balakin, R.V. (2016). Assessing the tax systems' risk and efficiency in Russian regions at different levels of the budget system. *Finance and Credit*, 22(36), 2–18. (In Russ.)

Malkina, M. Yu. & Balakin, R.V. (2022). Stress Index of the Tax System of the Russian Federation in Terms of Tax Revenues. *Journal of Tax Reform*, 8(3), 251–269. DOI: doi.org/10.15826/jtr.2022.8.3.120

Malkina, M. Yu. & Balakin, R. V. (2023). The Relation of Financial and Industrial Stresses to Monetary Policy Parameters in the Russian Economy. *Financial Journal*, 15(3), 104–121. DOI: [10.31107/2075-1990-2023-3-104-121](https://doi.org/10.31107/2075-1990-2023-3-104-121) (In Russ.)

Malkina, M. Yu. & Ovcharov, A. O. (2019). Financial Stress Index as a Generalized Indicator of Financial Instability. *Financial Journal*, 3, 38–54. DOI: [10.31107/2075-1990-2019-3-38-54](https://doi.org/10.31107/2075-1990-2019-3-38-54) (In Russ.)

Malkina, M. Yu. (2022). Resilience of the Russian Regional Economies to the 2020 Pandemic. *Spatial Economics*, 2022, 18(1), pp. 101–124. DOI: [10.14530/se.2022.1.101-124](https://doi.org/10.14530/se.2022.1.101-124) (In Russ.)

Mikheeva, N. N. (2021). Resilience of Russian Regions to Economic Shocks. *Studies on Russian Economic Development*, 32(1), 68–77. DOI: [10.1134/S107570072101010X](https://doi.org/10.1134/S107570072101010X)

Minakir, P. A. & Naiden, S. N. (2021). Social Dynamics in the Russian Far East: Failure of the Institutional Paradigm. *Regional Research of Russia*, 11(2), 139–150. DOI: [10.1134/S2079970521020118](https://doi.org/10.1134/S2079970521020118)

Mitrofanova, I. V., Batmanova, V. V., Trilitskaya, O. Y. & Chernova, O. A. (2021). Trends, Risks and Prospects for Industrial Complex Development of South of Russia in New Economic Realities. *Serbian Journal of Management*, 16(2), 419–436. DOI: [10.5937/SJM16-28723](https://doi.org/10.5937/SJM16-28723)

Mitrofanova, I. V., Chernova, O. A., Nagy, H. & Pleshakova, M. V. (2022). Adaptation Potential of Inclusive Growth of the Regions of the South of Russia in the Context of the COVID-19 Pandemic. *Smart Innovation, Systems and Technologies*, 287, 35–46. DOI: [10.1007/978-981-16-9804-0_4](https://doi.org/10.1007/978-981-16-9804-0_4)

Mutascu, M., Tiwari, A. & Estrada, F. (2011). Taxation and Political Stability. *SSRN Electronic Journal*. Retrieved from <https://mpra.ub.uni-muenchen.de/32283/> DOI: [10.2139/ssrn.1888328](https://doi.org/10.2139/ssrn.1888328)

Nerudova, D., Hampel, D., Janová, J., Dobranschi, M. & Rozmahel, P. (2019). Tax System Sustainability Evaluation: A Model for EU Countries. *Intereconomics*, 54, 138–141. DOI: [10.1007/s10272-019-0811-6](https://doi.org/10.1007/s10272-019-0811-6)

Pogorletskiy, A. I. & Pokrovskaia, N. V. (2021). Comparative Analysis of Fiscal Regulation Measures of the G20 Countries in the Era of the Coronavirus Crisis and in the Post-Coronavirus Perspective. *Journal of Applied Economic Research*, 20(1), 31–61. DOI: [10.15826/vestnik.2021.20.1.002](https://doi.org/10.15826/vestnik.2021.20.1.002) (In Russ.)

Smirnov, S. V. & Smirnov, S.S. (2022). Monitoring Russian business cycle with daily indicators. *Voprosy Ekonomiki*, 5, 26–50. DOI: [10.32609/0042-8736-2022-5-26-50](https://doi.org/10.32609/0042-8736-2022-5-26-50) (In Russ.)

Stepanov, A. V., Burnasov, A. S., Valiakhmetova, G. N. & Ilyushkina, M. Yu. (2022). The Impact of Economic Sanctions on the Industrial Regions of Russia (the Case of Sverdlovsk Region). *R-Economy*, 8(3), 295–305. DOI: [10.15826/recon.2022.8.3.023](https://doi.org/10.15826/recon.2022.8.3.023)

Stolbov, M. (2019). Constructing a Financial Stress Index for Russia: New Approaches. *HSE Economic Journal*, 23(1), 32–60. DOI: [10.17323/1813-8691-2019-23-1-32-60](https://doi.org/10.17323/1813-8691-2019-23-1-32-60) (In Russ.)

Troyanskaya, M. A. & Vylkova, E. S. (2019). Fiscal sustainability of the region: Assessment indicators. *Regional Economics: Theory and Practice*, 1(460), 121–139. (In Russ.)

Tsepelev, O. A. & Kakaulina, M. O. (2014). Stability of tax system as factor of economic growth in the regions of Russia. *Finance and Credit*, 20(14), 41–45. (In Russ.)

Turgel, I. D., Chernova, O. A. & Usoltceva A. A. (2021). Resilience, robustness and adaptivity: Large urban Russian Federation regions during the COVID-19 crisis. *Area Development and Policy*, 11, 1–23. DOI: [10.1080/23792949.2021.1973522](https://doi.org/10.1080/23792949.2021.1973522)

Zhikharevich, B. S., Klimanov, V. V. & Maracha, V. G. (2021). Resilience of a Territory: Concept, Measurement, Governance. *Regional Research of Russia*, 11 (1), 1–8. – DOI: [10.1134/S2079970521010135](https://doi.org/10.1134/S2079970521010135)

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ARTICLE INFO: received July 24, 2023; accepted November 06, 2023

ИНФОРМАЦИЯ О СТАТЬЕ: дата поступления 24 июля 2023 г.; дата принятия к печати 06 ноября 2023