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## Projected shortfall in personal income tax revenues of regional governments in Russia due to the COVID-19 pandemic

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### ABSTRACT

The COVID-19 pandemic has put a great strain on the Russian economy and budget revenue. The study aims at furnishing an estimate of losses in personal income tax revenue in regional government budgets in 2020–2023 due to the COVID-19 pandemic. In order to investigate the shortfall in tax revenues, three factors were studied: the amount of damage caused by the COVID-19 outbreak to the whole economic system; the sensitivity of the state revenue base to the crisis; the sensitivity of regional tax revenue to the revenue base. The study was based on the annual reports of the Federal Tax Service of Russia, Rosstat data, Forecast of the Social and Economic Development of the Russian Federation, and data from the “National action plan to ensure the recovery of employment and incomes of population, economic growth and long-term structural changes in the economy”. It was found that recession will lead to a significant reduction in people’s income over the given period. As a result, personal income tax revenues will decrease. The budget losses will reach 416.6 billion rubles by the end of the 2020 fiscal year. This is equivalent to 0.4% of GDP and 9.7% of total income from personal income tax in an economic situation unmarred by the pandemic. The largest fall in public revenue is expected in the regions which stand out in regard to personal income tax revenues per capita. The research results confirm the initial hypothesis that the negative impact of the pandemic on personal income tax revenues depends on the share of income tax revenues of a particular region or municipality. The findings can be used by the regional and municipal financial authorities for developing draft budgets for 2022 and the planning period of 2023–2024.

### KEYWORDS

personal income tax, budget losses, consolidated regional budget, forecast, COVID-19 pandemic

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## Прогноз потерь региональных бюджетов России от снижения поступлений подоходного налога в связи с пандемией COVID-19

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### АННОТАЦИЯ

Пандемия COVID-19 нанесла серьезный ущерб российской экономике и доходам бюджета. Целью исследования является построение прогноза сокращения доходов по налогу на доходы физических лиц в консолидированные бюджеты субъектов Российской Федерации в период 2020–2023 гг. вследствие пандемии

COVID-19. Для прогнозирования снижения налоговых поступлений анализировались три фактора: размер ущерба, нанесенного пандемией COVID-19 экономической системе в целом; чувствительность налоговой базы государства к кризису; чувствительность региональных налоговых поступлений к изменению доходной базы. Исследование проводилось на основе данных годовых отчетов Федеральной налоговой службы России, данных Росстата, Прогноза социально-экономического развития РФ, а также данных «Общенационального плана действий, обеспечивающих восстановление занятости и доходов населения, рост экономики и долгосрочные структурные изменения в экономике». Было определено, что рецессия приведет к существенному сокращению денежных доходов населения за анализируемый период, что отразится на снижении поступлений налога на доходы физических лиц в консолидированные бюджеты субъектов РФ. Бюджетные потери составят 416,6 млрд р. по итогам 2020 финансового года. Это эквивалентно 0,4% ВВП и 9,7% совокупных доходов от подоходного налога в экономической ситуации без учета пандемии. При этом наибольшее снижение ожидается в регионах лидирующих по объему поступлений налога на доходы физических лиц в расчете на душу населения. Таким образом, подтвердилась гипотеза о зависимости отрицательного воздействия пандемии COVID-19 на поступления налога на доходы физических лиц от объемов поступлений этого налога в бюджет конкретного региона или муниципалитета. Полученные результаты могут быть использованы Министерством финансов при разработке прогноза консолидированного бюджета РФ, проекта федерального бюджета РФ, а также финансовыми органами субъектов РФ и муниципальных образований в ходе разработки проектов бюджетов соответствующих территорий на 2022 г. и плановый период 2023–2024 гг.

#### КЛЮЧЕВЫЕ СЛОВА

налог на доходы физических лиц, консолидированный бюджет субъекта РФ, бюджетные потери, прогноз, пандемия COVID-19

### 1. Introduction

The COVID-19 pandemic has placed great strains on the state budget of the Russian Federation: the shocks incurred by the pandemic have led the federal, regional and local governments to struggle with staggering revenue losses and budget shortfalls. One of such shocks was brought about by the restrictions aimed at curbing the spread of the disease.

Although the effects of the pandemic can be found on all three levels of the budget system, regional and municipal budgets have turned out to be the most vulnerable in this situation. This can be explained by the fact that regional and municipal governments' authority to issue debt instruments is rigorously limited in Russia.

The personal income tax (PIT) provides one of the main sources of revenue for regional and local governments: over 40% of fiscal revenues of regional governments are generated by this tax. The major blow dealt by the 2020 pandemic to the national economy also had

a massive effect on the taxation base – individual income of Russian citizens. In general, the situation on the labour market still remains precarious, which jeopardizes the efficient implementation of the consolidated federal budget regarding the collection of the personal income tax.

Unlike other similar studies, this research compares PIT receipts in 2020 not with the receipts of the previous period but with the receipts in the same year but according to the scenario where the pandemic had not occurred (non-COVID scenario).

Therefore, this study aims at developing projections of the losses in tax revenue of regional governments in 2020–2023 due to the COVID-19 pandemic.

The hypothesis of this study is that the pandemic had an asymmetrical negative effect on the receipts from the PIT to regional and local budgets: the larger are the tax receipts to the consolidated budget of a Russian region, the stronger is this effect.

The article is structured as follows.

Section 2 surveys the existing research literature on the problem. Section 3 describes the research methodology.

The first part of Section 4 analyzes the macro-economic data showing the scale of the crisis caused by the pandemic in 2020 and 2021 and estimates how the effects of the pandemic were reflected in the Forecast of Socio-Economic Development of the Russian Federation.

The second part of Section 4 addresses the question as to which taxes play the most significant role of Russian regions and municipalities.

The third part of Section 4 estimates how the changes in the Forecast of Socio-Economic Development may influence the general tax revenue and tax revenues of specific territories, with a special focus made on the personal income tax. In doing so, we are going to rely on the current international research data on the sensitivity of tax revenue to changes in the taxable income.

## **2. Literature review**

Hua Xu and Huiyu Cui [1] suppose that the PIT is one of the major taxes widely used by both developed and less developed countries. They argue that PIT policy has gone through several rounds of revision as it has become an increasingly important source of revenue and a policy instrument in China's financial system over the past several decades.

Irena Szarowska [2] contends that importance of PIT is not only in their financial contribution to the public budgets (in average, personal income taxes are the second most important source of tax revenues in line with Eurostat tax classification), but also in their impact on other government policies and goals (e.g. an economic growth, a redistribution, country's competitiveness, a functioning of labour markets or fiscal federalism) at the same time.

Their viewpoint is shared by Desislava Stoilova [3], who argues that the PIT and social contributions have strong positive effects on growth. She also concludes that tax structure based on selective consumption taxes, taxes on personal income

and property is more supporting to the economic growth.

J. Olejniczak [4] examines the significance of shares in the PIT constituting the revenues in all Polish urban municipalities in 1996–2014. His analysis has revealed significant differences between the urban municipalities in Poland in the scope of acquired shares in the PIT. This diversity stems from the differences in the tax bases of urban municipalities. Interestingly, the share of the PIT in the total revenue was found highly significant for all municipal budgets.

G. Dobrota et al. [5] consider the PIT as one of the fiscal tools that have a direct influence on public revenue. The authors analyze the receipts from the income tax and show the correlation between GDP, social security payments, level of employment, unemployment rates and the level of taxable income – the average nominal monthly wage in Romania.

M. Ibragimov et al. [6] argue that tax revenue to a great extent depends on the collection of the PIT, which, in its turn, is associated with the distribution of wages across industries. They also propose an approach to modelling and forecasting of PIT revenue in the absence of data on wages in different industries. This methodology can be applied if only industry-specific aggregate data and sampling observations for several industries are available.

A number of Russian and international studies investigate losses in tax revenues caused by various negative macro-economic factors, such as illegal labour migration, 'shadowization' of economy, falling oil prices, crises of different kinds, early retirement because of illness or disability and so on. Tax reforms involving an increase in the tax rates are often associated with risks that this measure will be detrimental for tax revenue. Some studies describe methods for estimating tax revenue shortfall. These approaches are systematized in Table 1 below.

To estimate the shortfall in PIT revenue, studies analyze the sensitivity of total PIT revenue to changes in the tax base (individual income).

The first researcher to propose a comprehensive approach to the computation of tax revenue elasticity was Robinson [15]. In his article he describes what he refers to as the 'traditional' way of forecasting taxes, which consists of estimating an equation linking the receipts of each tax to model variables and using it to forecast tax receipts given the model forecast of the tax base. The growth in total revenue will, in this case, depend on two separately identifiable factors: how fast the relevant tax base grows in relation to nominal GDP, and how fast tax grows in relation to the tax base. The main strength of this approach lies in the fact that it allows infor-

mation from many different sources to be assembled and used to provide a forecasting framework. As a result, it is calculated that the total tax base elasticity of PIT revenue in the UK is 1.6%.

There were earlier attempts to calculate the elasticity of tax revenue. For example, C.Y. Mansfield [16, p.434] estimated the automatic and discretionary changes in the revenues from specific types of taxes depending on the changes in GDP. Discretionary changes are understood as the legal changes in tax rates or in the tax base, the introduction of new taxes, and certain administrative efforts. Therefore, the indicator of elasticity that takes into

Table 1

### Approaches to quantifying tax losses

Author	Methodology
M.O. Kakaulina [7]	The scale of the shortfall in additional PIT revenue due to international migration can be estimated by looking at the number of labour emigrants/immigrants of a certain profession, the nominal wage payable in this profession in the Russian Federation, the standard child tax credit and the corresponding PIT rate for residents and non-residents.
M.O. Kakaulina [8]	The losses in PIT revenue from illegal labour migration are calculated as a difference between the potential and actual receipts from the income tax on earnings of foreign citizens.
M.E. Kosov [9]	Shortfalls in tax revenues can be estimated by building an econometric model which uses such factors as GDP, rouble exchange rate, the consumer price index and oil prices.
O.A. Tsepelev, O.S. Kolesnikova [10]	The amount of losses in PIT revenues caused by tax avoidance is calculated as a difference between the income tax revenue that theoretically should be received by the state budget in the absence of shadow economy and the actual sum of receipts.
M. Feldstein [11]	The deadweight loss of the income tax resulting from tax avoidance is calculated with the help of TAXSIM model by using the data from individual tax returns.
D. J. Schofield, R. N. Shrestha, R. Percival, M. E. Passey, S. J. Kelly, E. J. Callander [12]	Losses in PIT revenue caused by the early retirement of individuals due to bad health are measured by analyzing the output data of the microsimulation model Health & Wealth MOD. To analyze the differences in the income of people employed full-time, part-time and not in the labour force due to ill health, a multiple linear regression model is applied.
L. Calahorrano, L. Rebeggiani, S. Stöwhase, M. Teuber [13]	The possible long-term fiscal effects of demographic change (population ageing) are estimated by using microsimulation.
S.G. Belev, N.S. Moguchev, K.V. Vekerle [14]	To measure the shortfall in PIT revenue, it is proposed first to divide the tax base into the following two components: 1) The magnitude in labor intensity (intensive margin) associated with how many more or less individuals began to work; 2) The magnitude of participation in the labor force (extensive margin) associated with an individual's decision to work or not. Following this stage, an optimization model is built for an individual seeking to maximize their utility in accordance with the budget constraints, which implies a possibility of tax evasion.

account discretionary changes includes the positive effects of revenue administration, resulting from the changes in the legislation. By using the data on the economy of Paraguay, C.Y. Mansfield finds that the GDP elasticity of the individual income tax (with the account of discretionary changes) is 1.42%.

A.F. Friedlaender et al. [17] built LS models to measure the changes in the sales tax revenue in response to changes in per capita personal income and tax rates in specific US states. They found that the rate elasticity was on average 93%.

S.F. Gillani [18] conducted the decomposition of elasticities, arguing that the GDP elasticity of tax revenue can be divided into tax elasticity to base and base elasticity to GDP. She combined two methodologies for the estimation of the elasticity – the Divisia Index method and the proportional-adjustment method. The resulting values of the elasticities of the individual income tax for the Pakistani economy are 0.93, 1.12, and 0.72% respectively.

R.G. Holcombe and R.S. Sobel [19] provide evidence that income taxes are consistently more cyclically variable, and less predictable, than sales taxes. They used econometric modelling to identify the key factors that explain the differences in cyclical variability across US states. The average estimate of the total tax revenue elasticity of the individual income tax is 1.524%. The GNP elasticity of the tax base is 1.4%.

F. Mukkaram [20] examines the elasticity of major taxes in Pakistan by using the chain indexing method and finds that the estimates of elasticity are higher for direct taxes than for sales taxes. The long-run tax base elasticity of receipts from direct taxes is 1.3% while the short-run elasticity, 1.63%.

D. Bruce et al. [21] found that the long-run and short-run elasticity for income taxes is more than double that for sales taxes. To explain the variation in elasticities across different states of the US, cross-section regression methods are employed. The average long-run elasticity of the personal income tax revenue is 1.8% and the short-run elasticity, 2.7%.

T. Havranek [22] estimated the short-run and long-run tax base elasticity of tax revenue by using quarterly data adjusted for the effects of reforms and showed that the long-run elasticity in the Czech Republic is 1.4 % for wage tax.

J.E. Anderson et al. [23] use using panel time series methods to estimate the long-run and short-run income elasticity of property tax revenue in Nebraska. Long-term elasticity estimated with the help of an OLS-model varies between 0.57 and 0.67%. Interestingly, much higher estimates of elasticity were characteristic of fast growing urban districts while much lower ones, of cattle farming areas. Estimates obtained with the help of the Dynamic OLS-model demonstrated a slightly higher level of long-term elasticity of tax revenue – 0.86%, accompanied by significant variations across urban districts.

M. Gillman [24] shows that the elasticity of the income tax revenue with respect to the US tax rate is influenced by the degree of reported income – the higher is the reported income, the lower is the elasticity. An increase in the tax rate causes the tax elasticity to increase in magnitude due to rising tax evasion.

Table 2 shows different estimates of the tax base elasticity of PIT revenues calculated by various authors.

Summarizing all of the above, it should be noted that the tax base elasticity of tax revenue is the value derived from the GDP elasticity of the tax base. D. Bruce et al. [21] and Y.K. Kodrzycki [29] show a gradual increase in the tax base elasticity of the PIT in the USA over time. As for the UK, the evidence points to the fact that the sensitivity of the PIT remains more or less the same within the interval of 1.5–1.6% [26; 27].

We believe that the most accurate estimates are given by B. Robinson [15], whose study relied on large macro-economic models of the Centre for Economic Forecasting of London Business School (LBS).

Recently there has been a rise in publications estimating the impact of the COVID-19 pandemic on tax receipts of specific territories.

Table 2

Author/source	Elasticity
J.P. Hutton, P.J. Lambert [25]	Personal income elasticity varies between 1.72–1.91% (based on the UK data)
J.P. Hutton, P.J. Lambert [26]	Per capita income elasticity varies between 1.38–1.66% and is directly dependent on income inequality (based on the UK data)
J. Creedy N. Gemmell [27]	Aggregate revenue elasticity is 1.538% (based on the UK data)
J. Creedy, J. Felix Sanz-Sanz [28]	The per capita income elasticity is about 1.3% (based on the data on Spanish economy). There is a considerable variation among tax units in the revenue elasticity, with highly (positively) skewed distributions. The aggregate elasticities for each region display some variation associated with income distribution differences.
Y.K. Kodrzycki [29]	Real per capita personal income elasticity is 2.2% (based on the US data).

A. Auerbach et al. [30] argue that the total personal income tax revenue in US states will fall by 4.7% in 2020, by 7.5% in 2021 and by 7.7% in 2022.

E. Badger et al. [31] divided US states into two groups – those with ‘rosier forecasts’ that had managed to restore their tax revenue to the level of the previous year in 2020 and those whose revenue impact was much more severe.

L. Dadayan [32] considers the percentage changes of tax revenues of US states for different types of taxes. She points out that between 2014 and 2018, the growth in personal income tax revenues was volatile, largely due to federal policy changes. These changes created short-term tax windfalls for some states and shifted revenues between fiscal years. Interestingly, in 2015 and 2018 the growth in PIT revenues exceeded that of other taxes. However, the COVID-19 pandemic caused the job market to collapse resulting, in the first half of 2020, in the dramatic decline in income tax revenues in comparison with other taxes. There was also a drop in the per capita income tax revenues.

D. Belleville et al. [33] estimate the losses of US states caused by the postponement and possible cancellation of numerous events involving professional athletes, and thus leading to the loss of tax revenue resulting from state income taxes not being collected from professional sportsmen. They found that US states are

likely to lose nearly 307 million US dollars in jock tax collections.

J. Karnon [34] discusses the possibility of introducing a temporary income tax levy in the USA as an optional policy aimed at minimizing the negative effects of the crisis on the state budget. He believes that an increase in tax revenue in the time of crisis is unlikely to reduce economic activity or to displace economic activity or reduce population wellbeing and longer-term government revenue.

It should be noted that, despite the vast number of research papers on this topic, there is still a perceived lack of comprehensive analysis that would provide a forecast of public revenue losses as a result of the pandemic’s impact on economy.

### 3. Methodology

The shortfall in tax revenues of Russian regions can be analyzed by focusing on the following three factors: the first factor is the amount of damage caused by the COVID-19 outbreak to the whole economic system; the second is the sensitivity of the state revenue base to the crisis; and the third, is the sensitivity of regional tax revenue to the revenue base.

In other words, the first factor is associated with the increased risk of rising bankruptcy rates and the related increase in unemployment, fall in wages and general income. The second factor corresponds to the impact of these trends on the revenue base of regional and local govern-

ments while the third factor reflects the effect that the reduction in the revenue base has on tax revenues.

All of the above determined the structure of this study.

At the first stage, we estimated the reduction in the taxable base (income). The data were obtained from the official statistics published by Rosstat and the Forecasts of Socio-Economic Development of the Russian Federation. In our calculations we relied on the method of comparison.

It should be noted that the Ministry of Economic Development published its Forecast of Socio-Economic Development in September 2019 for the period until 2024 and in September 2020, it released a revised version of this forecast. The new version of the Forecast was based on the estimated potential effect of the COVID-19 pandemic on various macro-economic indicators.

The difference between the proposed approach to the calculation of percentage change and other approaches described in research literature lies in the fact that the planning value of a chosen indicator is compared not with its actual value in the previous period but with its planning value in the current period specified in the Forecast of Socio-Economic Development of the Russian Federation. Thus, we are going to compare the actual macro-economic situation in the country in 2020 with the no-outbreak scenario.

At the second stage we considered the shortfall in income tax revenue faced by different Russian regions. This indicator reflects the two factors that we take into account in our estimations. First, for some regions, the PIT is one of the main sources of tax receipts; second, some regions' total tax revenue exceeds that of other regions, such that a given percent decline generates a greater absolute decline. To make our data comparable, we recalculated PIT revenue per capita. At this stage we intend to use Rosstat data and the data from the annual reports issued by the Federal Tax Service of Russia. Methodologically, the analysis will rely on methods of comparative analysis and data visualization.

At the third stage it is estimated how the economic shocks affect PIT revenues of budgets of different levels. In order to answer this question, we combined three sets of data: first, the information about the scale and nature of macro-economic shocks (Section 4.1); second, the information about the main institutional characteristics of the tax base (Section 4.2); and third, the data from the research literature on the sensitivity of personal income tax revenue to changes in personal incomes.

It should be noted at this point that the economic aggregates discussed in Section 4.1 are approximate for the PIT base. Different types of income are taxed at different rates while some types of income are not taxed at all. Our calculations, for example, take into consideration the fact that all social welfare payments and benefits that help restore the level of employment and income, economic growth and long-term structural changes in the economy are not taxable.

In our estimations and forecasting of tax revenue losses, particular attention is given to the effects of the income tax reforms. Since the beginning of 2021, the Russian tax system has undergone a number of changes regarding the PIT. It is extremely difficult to estimate the effect that these reforms will have on the state budget, which is why we have chosen to rely on expert opinions in public media.

1) return to the progressive scale, which implies differentiated PIT rates for different income levels. For the personal income tax, the rate will be raised to 15% for those individuals who earn more than 5 million roubles a year. Moreover, it will not be applied to the entire tax base, but only to the sum of excess of 5 million roubles a year. Basic rate of 13% will be applicable for those taxpayers who earn 5 million roubles or less. It is expected that the introduction of the progressive scale will bring to the state budget extra 60 billion roubles in 2021; 64 billion in 2022 and 68.5 billion in 2023.

2) Interest income on deposits will be subject to the PIT rate of 13% in the part exceeding the non-taxable minimum. The latter equals the product of 1 billion rou-

bles and the key rate of the Bank of Russia as of the first day of the fiscal period. Assuming that the key rate remains 4.25%, the amount of non-taxable income will be 42.5 thousand roubles a year (1 mln rbs 4.25% = 42.5 ths rbs). It is expected that the introduction of a tax on income from large deposits will bolster public finances and provide the state budget with about 113 billion roubles a year.

3) An increase in the rate of the PIT on dividends transferred to overseas accounts to 15%. The estimated value of the tax base is about 5,014.4 billion roubles while the extra revenue generated by raising the tax rate is about 518.2 billion annually.

We calculated the total PIT revenue shortfall (Section 4.3) by following the methodology proposed by Clemens and S. Veuger [35]:

$$RS_{i,b} = CR_{i,b} \cdot BD_b \cdot RE_b \quad (1)$$

where  $RS_{i,b}$  (*Revenue Shortfall<sub>i,b</sub>*) is the total PIT revenue loss of the government of the  $i^{\text{th}}$  region for tax base  $b$ ;  $CR_{i,b}$  (*Counterfactual Revenue<sub>i,b</sub>*) is the computed value of PIT revenue of the  $i^{\text{th}}$  region from tax base  $b$  under the hypothetical no-COVID-19 scenario. These estimates were obtained through forecasting by extrapolation based on the data of the Federal Tax Service on PIT revenues in 2019 and the growth in these revenues in the last decade;  $BD_b$  (*Base Decline<sub>b</sub>*) is the reduction in the tax base (income level) caused by the COVID 19 outbreak, which is discussed in detail in Section 4.1;  $RE_b$  (*Revenue Elasticity<sub>b</sub>*) is the estimate of the tax base elasticity of PIT revenue.

The relationship between PIT receipts and changes in the size of the applicable tax base depends on the progressivity of the tax scale. Progressive tax bases usually have income elasticity greater than 1. This means that the average tax rate will be lowered together with the shrinking tax base. Studies of the tax base elasticity of tax revenues have for a long time followed this logic.

We believe that on average in a given region PIT revenues will be falling by about 1.6% for every 1% decline in the personal income level. Such elasticity is based on the estimates of B. Robinson [15, p. 41] for the British economy. It should be noted

that our estimates of the shortfall in PIT revenues will shift in proportion to changes in this estimated elasticity.

In our view, the application of this value of elasticity is justified since, starting from 2021, Russia has returned to the progressive income taxation scale.

## 4. Empirical research results

### 4.1. Impact of the COVID-19 Pandemic on the Russian economy

Tables 3–5 contain the data reflecting the shocks suffered by the country's economy due to the outbreak of COVID-19. The scale of these shocks is estimated by looking at the percentage point changes in several macro-economic indicators.

Table 3  
Percentage point changes in the macro-economic indicators reflecting the economic shocks caused by the COVID-19 pandemic (baseline scenario)

Indicators	Δ2020	Δ2021
Unemployment, pp	1.1	0.7
Real wages, %	-0.8	-0.9
Real disposable household income, %	-4.5	-3.6
Total volume of production (works, services), %	-16.7	-15.5
Retail turnover, %	-4.3	-1.4
Volume of paid services provided to the population, %	-9.7	-6.1
Profit in all types of economic activity, %	-12.5	-9.8

Table 4  
Percentage point changes in the macro-economic indicators reflecting the economic shocks caused by the COVID-19 pandemic (conservative scenario)

Indicators	Δ2020	Δ2021
Unemployment, percentage points	1.1	0.7
Real wages, %	-0.3	0.2
Real disposable household income, %	-4.1	-3.6
Total volume of production (works, services), %	-13.3	-13.1
Retail turnover, %	-4.3	-1.3
Volume of paid services provided to the population, %	-9.7	-7
Profit in all types of economic activity, %	-7.5	-7.0

Table 5  
**Percentage point changes  
 in the macro-economic indicators  
 reflecting the economic shocks caused  
 by the COVID-19 pandemic**

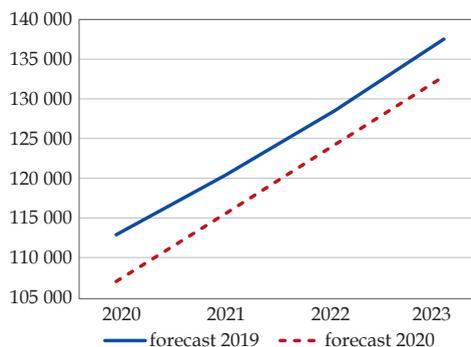
Indicators	$\Delta 2020$	$\Delta 2021$
Household consumption expenditures, %	-6.2	3.1
Gross fixed capital formation, %	-6.0	2.5
Consolidated budget balance, % of GDP	-4.6	-3.0

According to the conservative scenario outlined in the Forecast of Socio-Economic Development of the Russian Federation (Table 4), in 2020, the rise in unemployment was about 1.1 pp in comparison with the previously projected value for this year. In 2021, this indicator is expected to increase – by 0.7 pp. In 2020, the real wages fell by slightly more than 0.3% and it is expected that this indicator will recover to 0.2% in comparison with the previously projected values. The fall in the real disposable income turned out to be more substantial – 4.1% in 2020 and 3.6% in 2021, which can be explained by this indicator's dependence not only on the national wage level but also on another important source of income – business income. Judging by the available data, we may conclude that there was an unprecedented slump in the real disposable income.

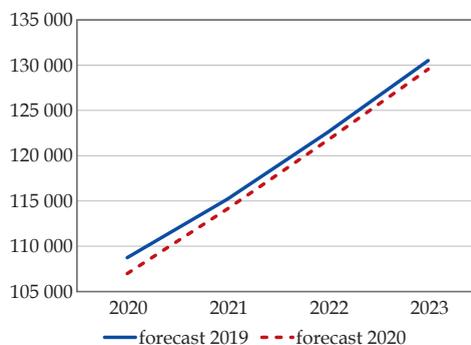
According to the baseline forecast, the situation appears to be even more alarming, with more severe effects of the economic shocks. Total household spending in 2020 fell by approximately 6.2%, which is the largest drop in the last 15 years. Although the general level of spending remained virtually the same, there were significant differences in the structure of consumption. For instance, the expenditures on eating out fell almost twice. Household expenditures on food grew dramatically in March and April and then the previous trend was restored. There was a considerable rise in consumption expenditures on durable goods and health care while spending on professional non-medical services (e.g. financial and legal services) remained relatively stable.

The above-described picture can be explained by the drop in income, objective decline in daily spending during the lockdown period as well as people's natural reaction to the crisis as they were trying to stash a financial cushion. It is expected that in 2021 there will be a 3.1% increase in total household spending in comparison with the data of the previous forecast published in 2019.

Figures 1 and 2 illustrate the changes in GDP forecasts of Russia's Ministry of Economic Development for 2020–2023.



**Fig. 1. Projected GDP dynamics in 2020–2023, bln rbs (baseline scenario)**



**Fig. 2. Projected GDP dynamics in 2020–2023, bln rbs (conservative scenario)**

The data show that a severe slump in GDP in all the given periods is expected, which will be followed by a recovery from the levels that are much lower than those specified by the previous forecasts.

Figures 3 and 4 illustrate the general income levels. These time series are directly related to the following estimations in the two dimensions: the first dimension is the main time series (according to the

Forecast of 2019) and the second, the additional time series (according to the Forecast of 2020). These aggregated data are necessary to estimate the scale of shocks suffered by the PIT base.

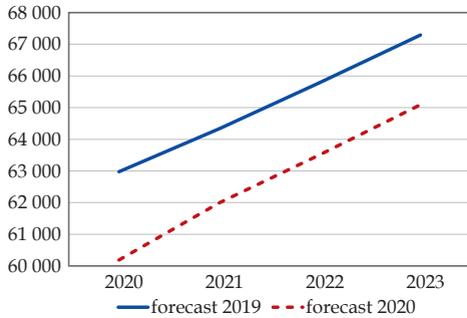


Fig. 3. Projected dynamics of individual incomes in 2020-2023, bln rbs (baseline scenario)

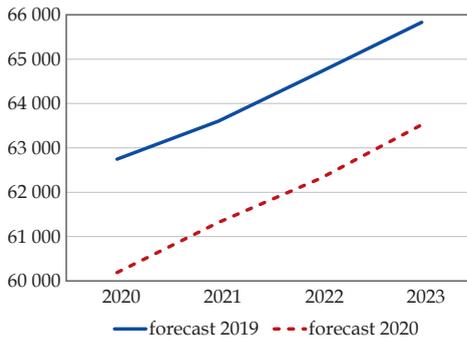


Fig. 4. Projected dynamics of individual incomes in 2020-2023, bln rbs (conservative scenario)

The data in Figures 3 and 4 demonstrate that, according to the new forecast, the income in the given period will ‘stabilize’ at the levels that are approximately 3-4% below the previous forecast values.

**4.2. Analysis of regional and local governments’ reliance on different types of taxes**

To construct a sample, we need to rank the territories by their PIT revenues. To study the consequences of the pandemic, it seems most promising to choose for analysis those Russian regions that rank high in terms of PIT revenues per capita.

Figure 5 illustrates the distribution of PIT receipts across Russian regions in 2020.

11 regions with the highest PIT receipts are as follows: the Chukotka Autonomous District, Yamalo-Nenets Autonomous District, Nenets Autonomous District, Magadan region, Kamchatka region, Sakhalin region, Moscow (city), Khanty-Mansiysk Autonomous District – Yugra, Murmansk region, the Republic of Sakha (Yakutia), and St.Petersburg (city). In 2020, the PIT receipts of the country’s state budget provided by these regions varied between 51 and 143 thousand roubles per capita.

The high revenues from the income tax collected in these regions can be ex-



Fig. 5. Map of the distribution of PIT revenues in 2020, ths rbs per capita

plained the following way: Moscow and St. Petersburg have the highest wages among other Russian regions while the other regions from this list are located in the Far North, which means that their inhabitants enjoy special benefits and compensations, including the multiplying 'district coefficient' applied to wages earned. In the above-mentioned northern regions such 'district coefficients' vary between 1.5 and 2. The population density in these regions is very low: in Russia's Far North, it is slightly above 11.5 million people (only 8% of the country's population). All of the above determines the high per capita tax receipts demonstrated by these regions.

Further we are going to analyze tax receipts of regional and municipal governments of these regions in order to gain a better understanding of how tax receipts in specific regions are distributed by tax type.

Table 6 summarize the statistical data on the given regions in 2020.

Table 6 shows that the revenues of different Russian regions are dominated by different tax types. For instance, regions' dependence on the corporate income tax (CIT) for their tax revenues varies between 31.9% of the general tax revenue in the 10th percentile to 60.5% in the 90th percentile. With regard to our data it means that at least in 10 out of 11 given regions (90% of the sample), the share of the CIT is over 31.9% while at least in 1 out of 11 given regions (10% of the sample), the share of this tax is over 60.5%. The same is true for the

PIT: at least in 10 out of 11 given regions (90% of the sample), the PIT accounts for over 17.7% while at least in 1 out of 11 of the given regions (10% of the sample), it accounts for over 50.2%.

Thus, the PIT is one of the main revenue sources for Russian regions. A Russian region from the 10th percentile obtains over 17.7% of its general tax revenue from this tax while a region from the 90th percentile, over 50.2%. Property taxes demonstrate a somewhat different pattern: a region from the 90th percentile relies on this category of taxes to a lesser extent – 40.4% of tax revenue.

The last columns of Table 6 show how an increase in regional tax revenues corresponds to the size of the country's economy in general. In 2020, the given regions raised over 3.6 trillion roubles of tax. Overall, these revenues are equivalent to 3.5% of the country's GDP (17.9% of the state government's tax revenue). The PIT revenue to the consolidated state budget of the Russian Federation from these regions is 1.6 trillion roubles, which is slightly less than 1.5% of GDP (7.6% of tax revenue).

#### 4.3. Impact of economic shocks on tax revenues of regional and municipal governments

Table 7 illustrates the forecast PIT revenue losses of the state government due to the COVID-19 pandemic in 2020–2024 according to the baseline and conservative scenarios and the input data for our calculations.

Table 6  
Distribution of the total tax revenue of regions by tax category in 2020

Type of tax	Number of observations	Average value, %	Median value, %	10 <sup>th</sup> percentile, %	90 <sup>th</sup> percentile, %	Revenue, ths rbs	% of tax revenue
Total tax revenue	11	100	100	100	100	3,615,832,552	100
Personal income tax	11	31.1	22.1	17.7	50.2	1,506,482,830	41.7
Corporate income tax	11	43	40.3	31.9	60.5	1,390,104,956	38.4
Mineral extraction tax	11	4.6	0.5	0	15.8	26,705,464	0.7
Property taxes	11	18.3	11.6	6	40.4	461,730,385	12.8
Other taxes	11	3	1.5	0	7.4	230,808,917	6.4

It should be noted that the computed value of the total PIT revenue losses is determined by the chosen scenario. If the future changes in the macro-economic conditions follow the baseline scenario, the amount of losses in PIT revenues in 2020 will be 416.6 bln rbs. In the conservative scenario, this figure will be 392 bln rbs.

The projected losses in tax revenue take into account the income tax hike on super-high earners and the taxation of interest on bank deposits. We, however, did not take into account the extra revenue obtained from setting the 15% tax rate on the income from dividends transferred to foreign accounts. Businesses' responses to such changes in legislation are rather difficult to predict. If full transparency is en-

sured, this will bring about 518.2 billion of extra revenue annually.

If the measures aimed at counteracting the negative economic impact of the pandemic prove to be effective, in 2021 we can expect an increase in PIT revenue in absolute terms. The tax revenue in 2021 will increase by 381.7 billion roubles and by 407.5 billion in 2023 (according to the baseline scenario). The expectations, however, should not be overly optimistic. We are going to further consider the differences in the tax revenue trends in the regions from our sample (these regions are the leaders in terms of per capita PIT receipts).

Tables 8 and 9 show our estimates of per capita PIT losses in these regions. The estimates were calculated by using Formula 1.

Table 7

Forecast PIT losses in 2020–2024

Years	Counterfactual revenue from the PIT to budgets of different levels bln rbs*	Reduction in the tax base (baseline scenario), share	Reduction in the tax base (conservative scenario), share	Estimated elasticity	Projected PIT revenue losses (baseline scenario), bln rbs	Projected PIT revenue losses (conservative scenario), bln rbs
2020	4,313.8	-0.060	-0.057	1.6	-416.6	-392.1
2021	4,705.0	-0.041	-0.041	1.6	-136.5	-133.7
2022	5,131.6	-0.035	-0.037	1.6	-107.9	-127.7
2023	5,596.9	-0.033	-0.035	1.6	-110.7	-132.9

Source: author's calculations

Note: \* Estimated tax revenue for a hypothetical non-COVID scenario forecast through the extrapolation method (based on the average growth rates in a 10-year period)

Table 8

Distribution of the forecast shortfall in PIT revenue per capita in 2020–2023 (baseline scenario)

Years	Number of observations	Average value, rbs per capita	Median value, rbs per capita	10 <sup>th</sup> percentile, rbs per capita	90 <sup>th</sup> percentile, rbs per capita
2020	11	-8,899	-8,398	-13,300	-5,385
2021	11	-6,661	-6,334	-10,002	-4,098
2022	11	-6,179	-5,917	-8,944	-3,864
2023	11	-6,393	-6,162	-8,903	-4,061

Table 9

Distribution of forecast shortfall in PIT revenue per capita in 2020–2023 (conservative forecast)

Years	Number of observations	Average value, rbs per capita	Median value, rbs per capita	10 <sup>th</sup> percentile, rbs per capita	90 <sup>th</sup> percentile, rbs per capita
2020	11	-8,374	-7,902	-12,514	-5,067
2021	11	-6,601	-6,277	-9,912	-4,061
2022	11	-6,610	-6,330	-9,567	-4,133
2023	11	-6,877	-6,629	-9,577	-4,368

The average PIT losses in the given regions, according to the baseline scenario, are 8,899 rbs per capita in 2020, falling to 6,393 rbs per capita by 2023. Since these are per capita figures, they may seem rather unimpressive but we should keep in mind that they are extrapolated to the overall decline of 416.6 and 110.7 billion roubles respectively (see Table 7).

It should be noted that the estimates of the projected losses in PIT revenue per capita differ significantly across the regions. These differences are explained by the following reasons: first, there is a considerable variation in the extent to which the given regions are reliant on PIT revenues; second, the larger is the per capita PIT revenue collected in a specific territory, the higher is the level of losses of this territory and vice versa. The leader in this respect is the Chukotka Autonomous District while the city of St.Petersburg is at the bottom of the list.

## 5. Discussion

Our analysis shows that with the help of the belt-tightening and tax-raising policy, the federal government has managed to mitigate the negative effects of the pandemic on tax revenues and to provide a stable influx of some extra PIT revenue in the mid-term, starting from 2021.

Regional and local authorities, however, will have to find other ways to deal with the shortage of funds since PIT payments on interest income from bank deposits and on income above 5 million roubles will first be directed to the federal budget.

Our analysis clearly demonstrates that in the institutional environment of Russia, it is the federal government that has to shoulder the burden of counter-cyclical policy. In practice, in the period of economic downturn, regions and municipalities receive financial grants from the federal government. Apart from increased equalization transfers and grants for maintaining balanced regional budgets, regional governments may count upon extra inter-budget transfers in the form of subsidies and other transfers.

In such circumstances, regional governments have nothing much to do but

to rely on federal subsidies. The existing Methodology for Distribution of Equalization Transfers of Russian Regions is based on the computation of the so-called fiscal capacity index or the potential ability of a Russian region to raise tax revenue. The total fiscal capacity index of a Russian region is calculated by adding up all the values of fiscal capacity for each type of tax. Fiscal capacity for the PIT is calculated by using the formula that contains the taxable household income in this or that fiscal year. The projected PET receipts are calculated by the Federal Tax Service by using the following indicators of the Forecast of Socio-Economic Development: wages fund; the coefficient characterizing the dynamics of the wages fund; coefficient characterizing the dynamics of tax deductions depending on the changes in the country's legislation and other factors; and so on.

This means that when equalization transfers are distributed among Russian regions, what is taken into account is not only the revenue losses attributable to tax relief, tax exemptions and tax preferences granted under the current fiscal legislation but also the shocks such as those that resulted from lockdown restrictions.

## 6. Conclusions

One of the crucial tasks of state financial agencies in the current situation is to forecast the pandemic-driven revenue shortfalls and thus to provide a better understanding of the scale of damage to regional and local budgets. Fiscal forecasting is essential to inform governmental decision-making regarding the measures to counteract the negative effects of the pandemic and setting the amounts of inter-budget transfers.

Our study has shown that the COVID-19 pandemic had a severe negative effect on such macro-economic indicators as GDP, income of households, unemployment rates, and so on. The percentage changes of these indicators were brought to light by the comparative analysis of the two documents – the Forecast of Socio-Economic Development of the Russian Federation of 2019 and 2020.

As this study has shown, the majority of regional governments rely primarily on the CIT for their revenue, with the PIT ranking second in importance.

It was found that PIT revenue is highly sensitive to changes in the tax base, which is why, in all likelihood, the recession will lead to a considerable decline in PIT revenue due to the falling income in 2020 and in the three consecutive years.

There is a considerable regional variability regarding the shortfalls in PIT revenue. The most significant decline is to be expected in the regions that are the leaders in terms of per capita PIT revenue – Chukotka, Yamalo-Nenets and Nenets autonomous districts.

Thus, our hypothesis that the COVID-19 pandemic had a detrimental effect on the PIT receipts of regional and municipal budgets and that there is a dependency between the strength of the ef-

fect of the pandemic and the reliance of this or that territory on this tax.

The recent tax reforms were quite effective in mitigating the impacts of the pandemic on tax revenues and providing stable extra revenue in the mid-term, starting from 2021. Instead of going directly to regional and municipal budgets, however, these funds will be later redistributed in the form of inter-budget transfers as a part of the state counter-cyclical policy.

Our research findings can prove useful to the Ministry of Finance in developing forecasts of the state consolidated budget and the draft of the federal budget (for allocating equalization transfers to Russian regions). This research can also be of interest to state financial agencies of Russian regions and municipalities for the development of their draft budgets for 2022 and the planning period of 2023–2024.

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