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Fiscal Effects of Labour Income Tax Changes in Russia

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ABSTRACT
The purpose of this article is to evaluate the fiscal effects of changes in social contribution rates in Russia for the period 2010–2014, which was marked by significant changes in tax legislation. The consequences of these changes for both the budget system and the labor market still have not been thoroughly studied. As the empirical and theoretical research shows, taxation could influence the labor market in two ways: through the intensive and extensive margin. This study tests the hypothesis about the two kinds of effects of taxation for Russia by using the data of the Russian Longitudinal Monitoring Survey. It is demonstrated that an increase in the social contribution rate causes a decline in labor participation both for women and men. Moreover, an increase in the social contribution rate causes a reduction in the net-of-tax wage level for women and men. The state has already exhausted the opportunities for raising social contributions and pushing the reforms further would mean jeopardizing budget revenues and fiscal sustainability. Generally, an increase in social contributions has had a negative impact on the government's revenues from social contributions and the personal income tax. It can be concluded that in general, the fiscal effects of the reforms were negative rather than positive. We would recommend the government to reconsider the current social contribution rates. Since the labour market is highly sensitive, it is possible to raise tax revenue through other means, thus avoiding adverse effects on public welfare.

KEYWORDS
fiscal effects, labor particapation, tax legislation, tax revenues, labor income taxation, nonlinearity of the tax scale, Heckman procedure, social contributions

JEL H24, H31, J22

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Оценка эффектов изменения налогообложения трудовых доходов в России

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АННОТАЦИЯ
Целью статьи является количественная оценка бюджетных эффектов от изменения ставок страховых взносов за период 2010–2014 гг., который отметился значительными изменениями в налоговом законодательстве. Последствия этих изменений, как для бюджетной системы, так и рынка труда в России до сих пор слабо изучены, в частности, как изменения ставок по страховым взносам повлияли на налогооблагаемую базу. Согласно эмпирическим и теоретическим работам, имеют место два канала влияния налогообложения на рынок

труда: интенсивность труда и участие в рабочей силе. В работе тестируются гипотезы о наличии этих двух каналов. Оценка производится на основе базы данных Российского мониторинга экономического положения и здоровья населения. Получены следующие результаты. При увеличении ставки по страховым взносам участие в трудовой деятельности снижается как для женщин, так и для мужчин. Также при увеличении ставки по страховым взносам чистая заработная плата также уменьшается для женщин и мужчин. В текущих экономических условиях налоговое бремя по страховым взносам уже избыточно, а возможности для повышения ставок страховых взносов не просто исчерпаны, а несут риски для пополнения бюджета и для бюджетной устойчивости. В целом повышение страховых взносов негативно сказалось на поступлениях страховых взносов и налога на доходы физических лиц. Бюджетные эффекты от проведённых реформ следует признать отрицательными. В качестве рекомендации следовало бы пересмотреть величину ставок по страховым взносам. В условиях высокой чувствительности рынка труда возможно обеспечить большую пополняемость бюджета без создания негативных эффектов на уровень общественного благосостояния.

КЛЮЧЕВЫЕ СЛОВА
бюджетные эффекты, участие на рынке труда, налоговое законодательство, налоговые поступления, налогообложение труда, нелинейность налоговой шкалы, процедура Хекмана, страховые взносы

1. Introduction

Even though employer is the formal taxpayer of social contributions from the perspective of tax legislation, a part of the tax burden could be shifted to employees. It happens when the net wage (earned by an employee) becomes smaller because of a new tax is introduced or the rate of the existing tax is raised. Social security contributions are deducted from the gross wage when calculating the net wage, which is why social contributions used to be viewed as a private case of labor taxation [1–6]. Moreover, in OECD reports on tax statistics[1], social contributions are considered when calculating the "tax wedge" indicator. Between 2010 and 2014, there were some serious changes in the rates of social contributions in Russia. These reforms were primarily driven by the government's desire to boost its fiscal revenues and therefore to have the source for financing a pension increase. For example, in 2010 the basic social contribution rate was raised from 26% to 34% in 2011. Afterwards, in 2012 it was lowered to 30% and at the same time the rate after the threshold was increased to 10%. These changes seem to be inconsistent, as if the Russian government by trial and error was trying to find the optimal social contribution schedule. However, the consequences of these changes for both the budget system and the labor market in Russia are still poorly understood. It is still not quite clear how the changes in social contributions rates affected the tax base.

The purpose of this study is to develop approaches that can help assess the fiscal effects caused by changes in social contributions rates in Russia. On one hand, the fiscal revenues from social contributions were growing in 2010–2014 (from 5.3% of GDP in 2010 to 6,3% of GDP in 2014). On the other hand, the shortage of fiscal revenues from the personal income tax (measured as a share of GDP) in 2011–2012[2] could be probably connected with the growth in social contribution tax rates due to the common tax base (labor income). To test this hypo-thesis, one should isolate the effect of the changing rates from other factors.

Thus, there are several hypotheses which will be accepted or rejected depending on the results of this study:

– the above-mentioned increase in social contribution rates in 2010–2014 caused (*ceteris paribus*) the decline in fiscal re-

[1] OECD Tax Database: Explanatory Annex, Part 3: Social Security Contributions; 2019.

[2] The period of the most dramatic increase in labor income tax burden of 2010–2014.

venues from the personal income tax and social contributions;

– this decline was a result of the elastic (to tax rates) tax base;

– the shrinking tax base occurred due to the drop in labor particapation and the cutback of net-of-tax wages

If these hypotheses are not rejected, it means that the main goal of these tax reforms had not been achieved. Moreover, it brings us to the discussion of what more effective changes in labor income tax schedule could be.

The structure of this paper is as follows. Our literature review deals with the theoretical literature in order to identify the channels of influence of income taxation on the labor market and with empirical works in order to determine possible methods for quantitative assessment of the effects of labour income taxation.

The section "Data and Methodology" describes the main changes in the collection of social contributions in Russia in 2010–2014. Based on the constructed theoretical model, we derived the specification of the econometric equation for assessing the elasticity of the labor supply at the rate of social contributions. Our estimates rely on the data from the Russian Longitude Monitoring Survey (RLMS).

The following sections present our econometric assessment of the effects and interpretation of the results of analysis.

2. Literature review

The peculiarity of social contributions in Russia lies in the fact that there is a rather weak connection between social contributions and social benefits that an employee or a self-employed person is entitled to if an insurance case occurs. Therefore, it is expedient to consider social contributions as a form of tax, in fact, it is important to highlight the gratuitous nature of these payments. Thus, social contributions, along with the personal income tax, are taxes on labor income.

The development of the scholarly interest in labor taxation began precisely with the effects related to the intensity of labor (e.g. high-income tax rates create incentives to work and earn less). In particular, the key point of interest is the elasticity of the labor income tax base [7]. Early studies focused on tax rate changes such as the factor of labor supply and demand [8; 9]. The estimation of labor supply and demand, however, poses several problems. The first one appears because the use of microdata still demonstrates little variation in hours of work[3], which is why studies based on microdata (like this paper) estimate the elasticity of labor income but not that of labor supply (or demand) measured in hours of work, as in [10]. According to this approach, the variation in efforts of an employer with fixed working time corresponds to the variation in wages [11].

However, dealing with the studies examining the effects of labor taxation, we should keep in mind that the decision about whether to work or not can also be endogenous with respect to changing tax rates. This problem has received little attention, because the early studies [7–9] considered the supply of labor of men who were supposed to have a low elasticity of participation, which is why the literature often neglected the effects associated with labor participation [12]. The main problem in analyzing the effects of labor force participation is that it is necessary to consider individuals who are not currently working [13; 14]. Consequently, it is impossible to determine the characteristics that are important for the analysis, for example, the level of labor income [15]. At the same time, the exclusion of those people who do not work can lead to the problem of non-random selection, which leads to a significant bias in the estimates of elasticities [16]. In the academic literature, this econometric problem could be solved by using non-random selection models (censored regression). This approach is widely used in labor market studies (for example, in [16–18]). The pioneering work in this respect was [19], which for the first time investigated selection bias as the authors proposed a censored regression methodology. Subsequently, this approach was

[3] Little variation in hours of work is the story typical of microdata, but not microdata.

implemented many times to obtain unbiased estimates of elasticities.

Another problem is the nonlinearity of the tax scale (for example, progressive or regressive personal income taxes). In this case, the estimates of elasticity would be biased due to the two-sided connection between tax rate and labor income. For example, the more income one has, the higher marginal tax rate will be applied in the case of progressive tax schedule. It means that not only does labor income depend on the tax rate, but the tax rate depends on labor income [20; 21]. In [11], it was proposed to add to the equation a variable characterizing the displacement of the budget constraint (so-called virtual income).

The last but not least is the problem of heterogeneity of elasticity among different sociodemographic groups (differences due to gender [22], to age and level of education [23], to marital status and number of children [24], to distribution of income [25]). The solution is to use sociodemographic characteristics as control variables or to cluster the sample according to some of them. The effect is usually the most heterogeneous due to gender [18; 22].

Summing up, the estimation of the effects of the labor income tax rate on the tax base should be divided into two components:

1) The magnitude in labor intensity (intensive margin) associated with how much more / 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.

3. Data and methodology

As a point of departure for our analysis, we are going to use the model from [15] and add social contributions. This model is a modification of the classical problem of the choice between the level of leisure and consumption. Modification of this model consists primarily in the fact that one of the parameters of the utility function is not the number of hours worked but the labor income. Thus, the individual's utility function is defined as follows:

$U = U_{(C;\, LI)}$ is the utility of an individual, and

$$\frac{\partial U}{\partial C} > 0;$$

C is the level of consumption of an individual;

LI is the labor income of an individual.

Since $LI = w \cdot l$, where is the hourly wage and l the number of working hours, this individual's utility function is not monotonic in variable LI.

Now let us formulate an optimization problem for an individual who would like to conceal some of their income to pay less taxes. The individual maximizes his utility in accordance with the budget constraint, which implies the possibility of tax evasion. Moreover, it is important to note that concealment occurs simultaneously – the invidivual evades social security contributions and income tax (1).

$$\begin{cases} U_{(C;\, LI)} \to \max\left(C;\, LI\right) \\ C = NLI + LI + \\ + \underbrace{\left[T^{inc}_{(LI)} - T^{inc}_{(LI^{rep})}\right]}_{\substack{\text{benefits from personal} \\ \text{income tax evasion}}} + \underbrace{\left[T^{soc}_{(LI)} - T^{soc}_{(LI^{rep})}\right]}_{\substack{\text{benefits from social} \\ \text{contributions evasion}}} \end{cases} \quad (1)$$

NLI is the individual's nonlabor income;

$T^{inc}_{(X)}$, $T^{soc}_{(X)}$ are social functions of taxation of labor income in the amount of X for personal income tax and social benefits, respectively;

LI^{rep} is the declared labor income, where $LI^{rep} \le LI$.

In this formulation of the model, it is obvious that with a constant (actual) gross wage, all the benefits from evasion are received by the employee. In this case, the welfare of the employer does not decrease, since, by understating the base, the employee actually does not work less than in the situation without evasion, and the employer does not care who will receive the payments: the state (in the case of non-evasion) or the employee (in the case of evasion). However, with a decrease in actual net wages, the benefits will be distributed between the employee and the employer.

It is important to note that parameter LI^{rep} is not fully endogenous, since the possibility of evasion is largely determined by the existing system of institutions, the specifics of the industry and the enterprise where an individual works. We are going to provide empirical evidence to support this premise further in this paper. Let us take the public sector as an example. As much as a public sector employee wants to evade taxes, he is unable to do so. In addition, evasion is often not an individual's deliberate choice, but a condition of recruitment. This situation is especially typical of the cases when the labor market is not entirely competitive. Therefore, in this model, parameter LI^{rep} will be considered exogenous with respect to the individual's decision.

The solution to this optimization problem is equivalent to maximizing the following function (2):

$$\mathcal{L}_{(C;\,LI;\,\lambda)} = U_{(C;\,LI)} + \\ +\lambda\left\{\begin{array}{c} C - NLI - LI - \\ -\left[T^{inc}_{(LI)} - T^{inc}_{(LI^{rep})}\right] - \left[T^{soc}_{(LI)} - T^{soc}_{(LI^{rep})}\right] \end{array}\right\} \rightarrow (2) \\ \rightarrow max(C;\,LI;\,\lambda).$$

The system of equations (3) follows from the necessary condition for an extremum:

$$\left\{\begin{array}{l} \dfrac{\partial\mathcal{L}}{\partial C} = \dfrac{\partial U}{\partial C} + \lambda = 0 \\ \dfrac{\partial\mathcal{L}}{\partial LI} = \dfrac{\partial U}{\partial LI} + \lambda\left\{-1 - \tau^{inc}_{(LI)} - \tau^{soc}_{(LI)}\right\} = 0 \\ \dfrac{\partial\mathcal{L}}{\partial\lambda} = C - \underbrace{\left\{\begin{array}{c} NLI + LI + \\ +\left[T^{inc}_{(LI)} - T^{inc}_{(LI^{rep})}\right] + \\ +\left[T^{soc}_{(LI)} - T^{soc}_{(LI^{rep})}\right] \end{array}\right\}}_{TI} = 0 \end{array}\right. , \quad (3)$$

TI is the total income of an individual.

Equation (4) follows from the solution of the system of equations (3):

$$MRS_{LI.C} = \frac{MU_{LI}}{MU_C} = \frac{\partial U \diagup \partial LI}{\partial U \diagup \partial C} = \\ = -1 - \tau^{inc}_{(LI)} - \tau^{soc}_{(LI)}, \quad (4)$$

$MRS_{LI.C}$ is the marginal rate of replacement of labor income by consumption;

$$\tau^{inc}_{(LI)} = \frac{\partial T^{inc}_{(LI)}}{\partial LI}$$

is the marginal income tax rate;

$$\tau^{soc}_{(LI)} = \frac{\partial T^{soc}_{(LI)}}{\partial LI}$$

is the marginal rate of social contributions.

Thus, the equilibrium level of labor income is an implicit function of the marginal rates of income tax, social contributions and total income: $LI^* = LI^*_{(1+\tau^{inc}_{(LI)}+\tau^{soc}_{(LI)};\,TI)}$. Since between 2010 and 2014 in Russia only the system of social contributions was reformed, the differential of function $LI^*_{(1+\tau^{inc}_{(LI)}+\tau^{soc}_{(LI)};\,TI)}$ will look the following way (5):

$$dLI^* = \frac{\partial LI^*}{\partial(1+\tau^{soc})} \cdot d\tau^{soc} + \frac{\partial LI^*}{\partial TI} \cdot dTI. \quad (5)$$

To transform this equation so that it can be interpreted in terms of elasticities, we are going to divide both of its sides by LI^*, multiply each term on the right-hand side and divide by the corresponding variable of the numerator's differentia. The result is the following equation (6):

$$\frac{dLI^*}{LI^*} = \zeta^I \cdot \frac{d\tau^{soc}}{(1+\tau^{soc})} + \eta^I \cdot \frac{dTI}{TI}, \quad (6)$$

$$\zeta^I = \frac{1+\tau^{soc}}{LI^*} \cdot \frac{\partial LI^*}{\partial(1+\tau^{soc})}$$

is the elasticity of labor income (before personal income tax is withheld) to the marginal rate of social taxation;

$$\eta^I = \frac{TI}{LI^*} \cdot \frac{\partial LI^*}{\partial TI}$$

is the elasticity of total labor income to the total income of an individual.

I index in the designation of elasticities means that these elasticities refer to estimates of the effects of labor intensity (intensive margin). The value of elasticity ζ^I will reflect the effect of replacing labor with leisure. From equation (6), the following specification for econometric model (7) may be obtained:

$$\ln LI = \alpha^I + \zeta^I \cdot \ln(1+\tau^{soc}) + \\ + \eta^I \cdot \ln TI + \epsilon^I. \quad (7)$$

It is important to note that this approach is consistent with the analysis of the impact of taxation in the case of a non-

linear scale, since there is a marginal rate in the regression equation, which depends on the amount of labor income.

Now let's look at the effects on labor force participation. When deciding whether to work at all, an individual is also guided by labor income taxation, more specifically, he makes a conditional comparison of utility in the case when he has a job and when he doesn't. If we formalize this comparison mathematically and use the optimal solution LI^* obtained above, the comparison is carried out between the following expressions (8):

$$U\left(\underbrace{NLI+LI^*+\left[T^{inc}_{(LI^*)}-T^{inc}_{(LI^{rep})}\right]+\left[T^{soc}_{(LI^*)}-T^{soc}_{(LI^{rep})}\right]}_{TI=C^*};\ LI^*\right) \sim U\left(\underbrace{NLI}_{TI^0};\ 0\right), \quad (8)$$

TI^0 is the total income of a non-working individual.

Thus, the decision to participate in labor force is an implicit function of total income and optimal labor income, excluding personal income tax deduction. In [15], the decision to participate in labor force also depended on nonlabor income since in the theoretical model in this article, nonlabor income was taxed on an equal basis with labor income. Due to the specifics of social contributions, nonlabor income is not included in the tax base. Therefore, it is enough to restrict ourselves to the use of total income, which coincides with the nonlabor income for non-working individuals. In addition, the presence of total income and labor income means indirect inclusion of nonlabor income in the model. In turn, the optimal labor income from the previous analysis is $LI^* = LI^*_{(1+\tau^{soc}_{(LI)};\ TI)}$. Consequently, an individual's decision to participate in labor force can be represented as follows (9):

$$W = W_{(TI:LI^*)} = \\ = W_{(TI;\ LI^*_{(1+\tau^{soc}_{(LI)};\ TI)})} = W_{(TI:1+\tau^{soc}_{(LI)})}, \quad (9)$$

$$W = \begin{cases} 1, & \textit{if the individual is working} \\ 0, & \textit{if the individual is not working} \end{cases}.$$

Since our goal is to estimate the probability of labor participation, expression (9) can be reduced to the following form (10):

$$P_{(W=1)} = \mathcal{F}_{\left\{TI:1+\tau^{soc}_{(LI)}\right\}}, \quad (10)$$

$P_{(W=1)}$ is the probability that the individual will work;

$\mathcal{F}$ the probability distribution function.

Depending on the choice of function $\mathcal{F}$, the logit and / or probit of the binary choice model will be built. There is an econometric procedure for adjusting estimates for possible non-random selection error.

The change in working status can be divided into two terms. Let us write out the differential of function (11):

$$d\mathcal{F} = \frac{\partial \mathcal{F}}{\partial(1+\tau^{soc})} \cdot d\tau^{soc} + \frac{\partial \mathcal{F}}{\partial TI} \cdot dTI. \quad (11)$$

Now we will carry out the same mathematical transformations as with equation (5) to interpret the equation in terms of elasticities. As a result, we get the following expression:

$$\frac{d\mathcal{F}}{\mathcal{F}} = \zeta^E \cdot \frac{d\tau^{soc}}{(1+\tau^{soc})} + \eta^E \cdot \frac{dTI}{TI}, \quad (12)$$

$$\zeta^E = \frac{1+\tau^{soc}}{\mathcal{F}} \cdot \frac{\partial \mathcal{F}}{\partial(1+\tau^{soc})}$$

is the elasticity of the probability of a person's labor force participation at the marginal rate of social contributions.

$$\eta^E = \frac{TI}{W} \cdot \frac{\partial W}{\partial TI}$$

is the elasticity of the probability of a person's labor force participation by his total income.

E index in the designation of elasticities means that these elasticities refer to estimates of the effects of labor force participation (extensive margin). The value of elasticity ζ^E will reflect the effect of substitution of labor for leisure in the limiting case. Since the explained variable is discrete (binary), it is necessary to use probabilistic discrete choice models to evaluate the effects.

The analysis will use the panel data from the Russia Longitudinal Monitoring Survey – Higher School of Economics for 2010–2014. There are two RLMS databases: individual survey results and household survey results. This structure is extremely important for the study, since, to assess the effects of labor income taxation, it will be necessary to supplement the data

on individuals with the characteristics of households.

From the model specification it follows that we need data on how much money an individual receives as wages. The RLMS questionnaire contains the question of how much money a person has received as a wage at the main place of work over the past 30 days, net of tax. Equation specification includes labor income, excluding personal income tax payments. But since the personal income tax rates have not changed over the period, this data can be used as the actual labor income, because the effect of the personal income tax will go into the constant of the equation. In addition, similar data are available for the second place of work. The main explanatory variable is the marginal social contribution (tax) rate. The tax base is the annual payroll.

The actual annual payroll was determined as follows:

$$\frac{Net\ sallary}{100\% - income\ tax\ rate} \cdot 12\ months.$$

According to the Russian tax legislation, social contribution rates depend on the industry in which an individual works. The RLMS database contains data on the industries of the first and second jobs. In accordance with the tax legislation, each industry was assigned its own tax schedule by using the RLMS codifier for each year. Thus, having determined the actual annual payroll and the industry where an individual works, each observation was assigned its own marginal tax rate.

Next, we need to decide on the variable of the aggregate income of an individual. Despite the fact that the theoretical model should use his total income by analogy with the empirical strategy, [15] used the total income of the household minus the labor income of the individual himself, since he is supported by the funds of the entire household. It is also advisable to include this variable in the model since the decision about how much to work may depend on whether other members of the household are employed or not. For example, all other things being equal, an individual's incentives to work are, on average, higher when other members of the household are not working or receive low wages, since more money is needed to support the family. If we include the total household income in the model, it will take into account this situation. This variable is contained in the RLMS for households. Thanks to the structure of the databases, it is possible to relate an individual to his/her household. In addition to the main explanatory variables, the model also needs to include control variables. These variables should reflect the characteristics of the individual himself, his household and the characteristics of the place of work. As a standard set of control variables characterizing an individual, we use gender, age, education, work experience, and marital status. As characteristics of the household, we will use the data on the total number of members, the number of dependents (it includes children under 18 as well as people of the retirement age and older).

In addition, the intensive margin is influenced by the factors associated with regional differentiation and the specifics of work. Therefore, it is worth including into the model the characteristics of the place of work and residence as control variables. First, it is worth adding a dummy variable indicating the type of settlement – city or village. In the RLMS there is a more detailed differentiation – a regional center, city, urban-type settlement, and village. In order not to overload the model with dummy variables, this parameter was transformed: a regional center was taken as a city, and an urban-type settlement as a village. Also, in the RLMS database there are data on the number of employees of a firm or enterprise where an individual works. This variable is interpreted as the size of a firm. In order to include it in the model, we have matched the codes of industries from the RLMS with those from the All-Russian Classifier of Types of Economic Activity (RCEAP) database (Appendix 1). All variables measured in rubles are converted into real terms (in prices of 2014).

It is worth noting that, if the declared income is included in the model as a dependent variable, it will allow us to esti-

mate the effect of labor intensity, taking into account possible tax evasion.

We chose the period of 2010–2014 because this was the time of the most significant changes in tax legislation in terms of social contributions. Figure 1 shows the dynamics of changes in the marginal rates of social contributions corresponding to the general tax regime. In addition to the general regime, tax legislation provides preferential treatment for employees in specific industries. In the given period, these mostly were workers in agriculture, IT and mass media. Thus, additional variation in the explanatory variable is provided by a person's transition from one industry to another.

As you can see (Fig. 1), the largest increase in tax rates was recorded in 2010–2011. In addition, changes in tax legislation also affected the thresholds. The dynamics of the thresholds, starting from the changes in the marginal rate, is presented below (Fig. 2).

Thus, we can observe a relatively high variation in social contributions' rates, which will allow us to obtain more accurate estimates of the elasticity of the labor supply. Our assessment of the elasticity of labor will help us determine to what extent the dynamics of revenue from social contributions is explained by the reforms in the field of labor taxation, namely, by changes in social contributions.

The non-linearity of the taxation scale creates additional difficulties in evaluating equation (7). In this case, it is not enough to use only the marginal rate as a regressor, since for individuals whose labor income is above the threshold of the main rate of social contributions the marginal rate could remain the same but the budget constraint will change its form because this individual would have to pay more

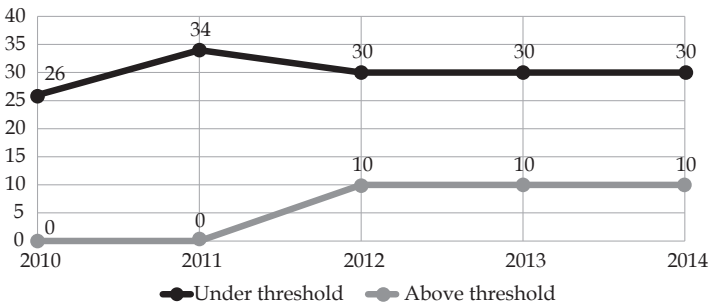

Fig. 1. **Changes in marginal social contribution rates**

Source: compiled by the authors based on the information from the Tax Code of the Russian Federation as amended for the corresponding year

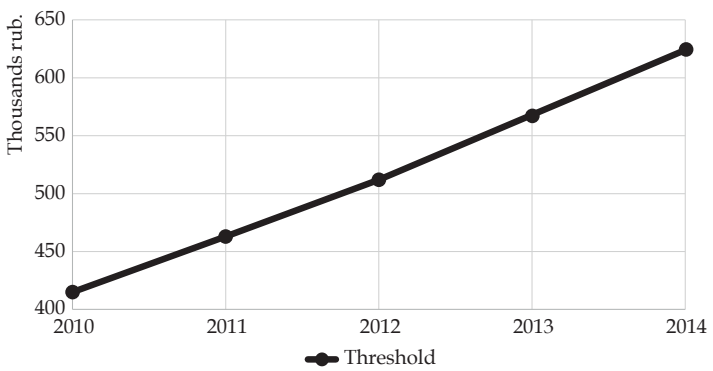

Fig. 2. **Changes in thresholds for determining the marginal social contribution rate**

Source: compiled by the authors based on the information from the Tax Code of the Russian Federation as amended for the corresponding year

because of the rise in the main rate. In this paper, we have included virtual income in the variable of total household income.

4. Results

Let us proceed to assessing the effects of labor force participation in the elasticity of the tax base resulting from the changes in labor taxation (extensive margin and intensive margin, respectively). We also need to take into account the possible problem of non-random selection caused by the unobserved characteristics of the potential place of work for non-working individuals.

Considering the econometric estimation of the probability of an individual entering and/or staying in the labor market, we must make certain assumptions concerning unobservable characteristics of his potential place of work. Salary is a key parameter in our analysis since the marginal rate of social contributions depends on its size. Taking into account the distribution of workers by wage (for a significant part of workers the amount of their wages will be below the first threshold), it is advisable to assume that the amount that workers who are going to enter the labor market will earn is below the first threshold, all other things being equal (their preferences are biased towards leisure). As a substantiation of this premise, we can cite the data on the median wages calculated by using the Rosstat data (Fig. 3). The figure below reflects the significant difference between these values. This means that at least a half of the workforce receives net wages below the given threshold. It is important to note that this gap is quite large, therefore, much less than a half of these workers receive salaries that exceed the threshold values. Since non-working individuals, on average, other things being equal, have lower earning abilities and / or a relatively higher opportunity cost of leisure time. Therefore, we assign to non-working individuals a tax rate that corresponds to incomes below the threshold. Thus, the dependent variable is the probability of an individual entering the labor market, and the variable of interest is the marginal rate of social contributions.

Heckman's procedure [19] assumes at the first step an assessment of the probability of going to work depending on the marginal tax rate on social contributions. The table below (Table 1) presents the results of evaluating the effect of labor force participation. As can be seen from the estimates, the probability of going to work is statistically significantly influenced (negatively) by the marginal rate of social contributions. This result is consistent with theoretical concepts. Even though formally the employer is the taxpayer, the actual tax burden is redistributed between the employer and the employee.

As a result, with an increase in the rate of social contributions by 1%, the probability of going to work decreases by 3.14% for women and by 2.98% for men.

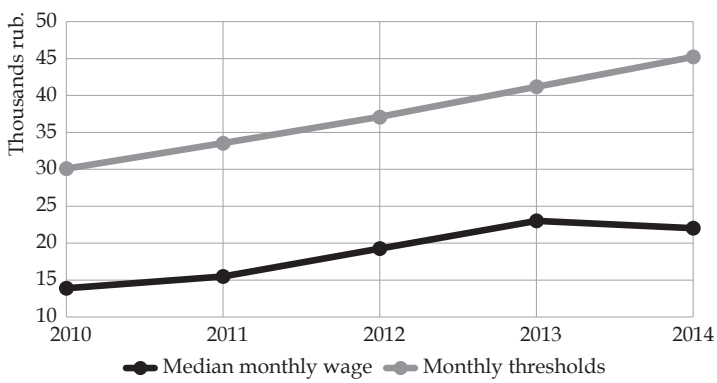

Fig. 3. **Comparison of the median wage and monthly thresholds of the social contribution tax scale**

Source: compiled by the authors based on the information from the Tax Code of the Russian Federation as amended for the corresponding year

It should be noted that women are more sensitive to an increase in tax rates, which is also consistent with the results of many studies discussed earlier. This result can be explained from the point of view of the theory of opportunity costs. Women tend to do most of the housework and they also take a more active part in caring for children, so the opportunity costs of going to work are much higher for them. Thus, this result is consistent with the differentiation of social roles by gender. Moreover, there is a difference in the signs of the coefficients with a variable marital status.

In addition, one should pay attention to the fact that it is not the regression coefficients themselves to be interpreted, but the slope coefficients which show the marginal effect for an average person in the sample. The signs for the control variables are also consistent with the previous theoretical and empirical research. The share of correctly predicted observations serves as an indicator of the quality of the model. In general, we can see that the binary choice models are built with a fairly high percentage of correctly predicted observations.

Table 1

Assessment of "the first step" in Heckman procedure (evaluating the probability of an individual entering the labor market)

Dependent variable: the individual participates/doesn't participate in labor force				
Regressors	**Women (18 and over)**		**Men (18 and over)**	
	Estimates	**Average Slope**	**Estimates**	**Average Slope**
Constant	−3.510*** (0.109)		−1.901 *** (0.126)	
Log. 1 + marginal social contribution rate	−3.135 *** (0.153)	−1.114	−2.982 *** (0.156)	−1.169
Log. the total household income excluding the individual's labor income	−0.073 *** (0.006)	−0.025	−0.083 *** (0.007)	−0.032
Education level, years	0.131 *** (0.005)	0.047	0.081 *** (0.006)	0.032
Family status	−0.167 *** (0.016)	−0.060	0.492 ** (0.023)	0.193
Work experience, years	0.003 ** (0.001)	0.001	0.002 *** (0.0008)	0.001
Disability	−1.043 *** (0.039)	−0.288	−1.434 *** (0.043)	−0.498
The individual is retired/not retired	−0.333 *** (0.031)	−0.118	−0.600 *** (0.041)	−0.236
Number of dependents, people	−0.163 *** (0.011)	−0.059	−0.034 (0.013)	0.013
Number of family members, people	0.006 (0.007)	0.002	0.015 * (0.009)	0.006
Accommodation in the city	0.127 *** (0.017)	0.045	0.284 *** (0.045)	0.112
Age, years	0.207 *** (0.004)	0.074	0.155 *** (0.045)	0.061
Age2 / 100	−0.244 *** (0.005)	−0.087	−0.192 *** (0.005)	−0.075
Number of observations	39357		24693	
Percentage of correctly predicted observations	78.2%		80.8%	

Source: compiled by the authors based on the information from the Tax Code of the Russian Federation as amended for the corresponding year.

Note – Designations in Table 1: * – significance at 10%; **, at 5%; ***, at 1%. The values in parentheses below the coefficients are standard errors.

After discussing the results of the evaluation of the equation for participation, one can proceed to the estimates of the elasticity of the tax base (Table 2). The dependent variable corresponds to the monthly wage in real terms (2014 was chosen as the base year) received by an employee. We deflated all wages according to regional inflation rates. Rosstat provided the regional data using 2014 as a base year. The specification of the equation includes an individual's labor income, net of personal income tax payments. Since the personal income tax did not change during the period under consideration, these data can be used as the actual labor income, since the effect of the personal income tax will go into the constant of the equation. Our assessment of the regression leads us to the following conclusion: an increase in the rate of social contributions by 1% results in a decrease in net wages by approximately 4.49% and by 4.30% for women and men, respectively. It means that an increase in the social contribution rates causes a decline in the

Table 2

Assessment of "the second step" in Heckman procedure (evaluating the elasticity of net-of-tax wage)

Dependent Variable: Declared monthly wages		
Regressors	**Women (18 and over)**	**Men (18 and over)**
	Estimates	**Estimates**
Constant	7.681 *** (0.074)	8.800 *** (0.078)
Log. 1 + marginal premium rate	−4.486 *** (0.080)	−4.302 *** (0.069)
Log. the total household income excluding the individual's earned income and including virtual income	−0.003 (0.002)	−0.006 *** (0.002)
Education level, years	0.111 *** (0.003)	0.060 *** (0.003)
Family status	−0.058 *** (0.010)	0.152 *** (0.012)
Work experience, years	0.001 (0.001)	0.001 *** (0.000)
Disability	−0.241 *** (0.036)	−0.358 *** (0.044)
The individual is retired/not retired	0.027 (0.019)	0.029 (0.026)
Number of dependents, people	−0.036 *** (0.001)	−0.013 * (0.007)
Number of family members, people	0.028 *** (0.005)	0.034 *** (0.005)
Accommodation in the city	0.183 *** (0.011)	0.217 *** (0.012)
Age, years	0.052 *** (0.003)	0.041 *** (0.003)
Age 2 / 100	−0.067 *** (0.004)	−0.060 *** (0.004)
Log. The size of the enterprise in which the individual works	0.071 *** (0.003)	0.074 *** (0.002)
λ – Heckman	0.076 *** (0.008)	0.021 *** (0.007)
Number of observations	39357	24693
Standard model error	0.625	0.629

Source: compiled by the authors based on the information from the Tax Code of the Russian Federation as amended for the corresponding year.

Note – Designations in Table 1: * – significance at 10%; **, at 5%; ***, at 1%. The values in parentheses below the coefficients are standard errors.

tax base. The signs at the control variables are also consistent with the previous emprirical results. The significance of the λ – Heckman variable should be highlightedt, since it indicates the statistical significance of the bias because of the non-random selection and, therefore, the expediency and necessity of using a censored regression (Heckman's procedure).

These estimates take into account the problem of non-random selection and thus enable us to assess the fiscal effects of the changes in social contribution rates, net of other factors. Special attention should be paid to the significance of the overwhelming number of variables, which also indirectly indicates the relatively good quality of the econometric models.

5. Discussion

In this study we assessed the impact of tax reforms on the economic behavior of individuals in relation to labor activity in Russia for the period 2010–2014. We distinguished between two effects, which, in their turn, reflect three possible reactions of workers to changes in labor income taxation.

The effect of labor intensity shows to what extent the equilibrium value of monthly wages has changed in response to changes in social contribution rates. In general, an increase in the rate of social contributions by 1% led to a reduction in wages by 4.49% for women and by 4.30% for men.

The tables below show the fiscal effects that were calculated on the basis of elasticities (coefficients in regressions at a variable rate of social contributions), namely, increases in tax revenue resulting from reforms of social contributions (Tables 3 and 4). Even though the reforms of labor income taxation 2010–2014 related exclusively to the collection of social contributions, they also influenced the revenue from the personal income tax, since labour income taxation and social contributions share the same taxable base.

Table 3

The growth of budget revenues in current prices (at the beginning of the period) raised from employees of the private sector, %

Period	Social contributions				Income tax			
	1	2	3	4	1	2	3	4
2010–2011	–8.1	–3.3	–6.1	**–17.5**	–3.2	–0.1	–1.4	**–4.6**
2011–2012	2.5	0.8	–21.3	**–18.0**	1.0	0	–5.8	**–4.8**
2012–2013	–0.1	–0.1	11.2	**11.0**	0	0	4.6	**4.6**
2013–2014	–0.1	0	8.3	**8.2**	0	0	1.2	**1.2**

Calculated by using the data from the RLMS and Tables 1 and 2.

Note – Explanation of notation: 1 – increase in tax revenues raised from people who earned less than the threshold value (intensive margin); 2 – increase in tax revenues raised from people who entered the labor market (extensive); 3 – increase in tax revenues raised from people with wages above the threshold; 4 – the sum of the first three: the total increase in tax revenues.

Table 4

The growth of budget revenues in current prices (at the beginning of the period) raised from employees of the state sector, %

Period	Social contributions				Income tax			
	1	2	3	4	1	2	3	4
2010–2011	–3.6	–0.1	–1.6	**–5.3**	–6.7	–0.1	–0.5	**–7.2**
2011–2012	1.2	0	–6.9	**–5.8**	2.1	0	-4.8	**–2.7**
2012–2013	0	0	11.2	**5.8**	0	0	1.5	**1.5**
2013–2014	0	0	1.4	**1.3**	–0.1	0	0.4	**0.3**

Calculated by using the data from the RLMS NRU-HSE and Tables 1 and 2.

Note – Explanation of notation: 1 – increase in tax revenues raised from people who earned less than the threshold value (intensive margin); 2 – an increase in tax revenues raised from people who entered the labor market (extensive); 3 – increase in tax revenues raised from people with wages above the threshold; 4 – the sum of the first three: the total increase in tax revenues.

In the current institutional environment, the burden from social contributions is already excessive. In other words, the state has already exhausted the opportunities for increasing social contributions and pushing the reforms further would mean jeopardizing budget revenues and fiscal sustainability. The growth in the revenue from social contributions is determined bythe growth in the revenue from public sector institutions, which means, in essence, transferring funds from "one budgetary pocket" to another. Moreover, there may be other factors at play here, unrelated to changes in the schedule of social contributions.

To this it should be added that the increase of social contributions had a negative impact on revenues from the personal income tax, which means that in general, the fiscal effects of the reforms were negative rather than positive.

6. Conclusion

Our hypothesis about the two effects of labour income taxes was confirmed: a 1%-increase in the social contribution rate leads to a 3.0% and 3.1% average decrease in labour participation for men and women, respectively. Moreover, a 1%-increase in the social contribution rate causes a 4.3% and 4.5% average decrease in net-of-tax wages for men and women, respectively.

These results mean that an increase in the social contribution rate has negatively affected the fiscal revenues from social contributions and the personal income tax. The fiscal effects of the reforms appear to be negative rather than positive. Thus, we would recommend the government to revise the social contribution rates. Since the labour market is highly sensitive, it is possible to raise tax revenue through other means thus avoiding adverse effects on public welfare.

The high elasticity of labor participation to the rate of social contributions suggests that it is advisable to reduce the rate of social contributions for low income levels. However, this requires a separate calculation since any decrease in rates for lower levels of income can have a strong effect on income (the so-called mechanical effect of changes in tax rates). At the same time, the more individuals there are in the population with low sensitivity of wages to tax rates on labor income, the higher is the risk that the fiscal effect of this measure will be insignificant.

A decrease in the basic rate of social contributions carries even greater risks of a negative mechanical effect. However, it may be worthwhile to consider a scenario where a reduction in one tax rate will be compensated by an increase in another rate for different groups of taxpayers.

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