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# RUSMOD

## A TOOL FOR DISTRIBUTIONAL ANALYSIS IN THE RUSSIAN FEDERATION

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## ABSTRACT

The purpose of this paper is to introduce applications of RUSMOD—a microsimulation model for fiscal incidence analysis in the Russian Federation. RUSMOD combines household survey micro-data and fiscal policy rules to simulate the Russian tax-benefit system: the size and distribution of taxes collected and benefits paid, and the impact of the system on different population groups. Microsimulation models, such as RUSMOD, are habitually used in developed countries, and can be versatile budgetary policy tools. Using this model, the current tax-benefit system in Russia is examined. The impact of the system is measured across the income distribution, age groups, family types, localities, as well as across time. One of the applications of RUSMOD this paper aims to assess is the role of the tax-benefit system in explaining the incidence of informal employment in Russia. The paper investigates whether the existing system creates disincentives for formalization in terms of reducing disposable incomes and increasing poverty and inequality, and whether a hypothetical tax reform would be able to reduce the opportunity costs of formalization for informal workers, improve distributional outcomes, and increase fiscal revenues.

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# RUSMOD - A Tool for Distributional Analysis in the Russian Federation

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## I. Introduction

Over the 2000s, the Russian Federation has shown progress in reducing poverty, alongside fairly steady economic growth. The average economic growth rate between 2000 and 2010 was 5.4 percent. The share of the population living in poverty declined for more than a decade, from around 30 percent in 2000 to about 11 percent in 2014, based on the national poverty line. Notwithstanding this progress, poverty reduction has stagnated, and in recent years, poverty increased, from 10.8 percent in 2013 to 13.3 percent in 2015 and stayed broadly unchanged since then. Income inequality, on the other hand, rose significantly during the economic transition in the 1990s, and has since stabilized at a high level by international standards. The country's Gini<sup>1</sup> index in 2017 at 41, is above the world average of 38 for 78 developed and developing countries circa 2010 (López-Calva, et al., 2017).

The fiscal system in the country is playing an increasingly important role in poverty reduction and inequality trends, particularly after the global financial crisis of 2008-09.<sup>2</sup> Fiscal incidence analyses indicate that, while the system of taxes and transfers in the country has a limited redistributive capacity across the income distribution, it does redistribute across socioeconomic groups. As shown in Lopez-Calva et al. (2017), households of individuals of working-age, both with and without children, are net payers, while pensioners' households are the only group that benefits from fiscal redistribution, and that the majority of the distribution takes place through pensions. Some of the major constraints to redistribution capacity previously identified include the large share of tax revenues that originate from indirect (regressive) taxes, a low share of spending on social assistance towards low-income groups, and the neutral impact of the personal income tax (ibid). Furthermore, the recent recession and continued period of slow growth in the country and the international sanctions are putting pressure for fiscal consolidation, bringing additional challenges to avoid worsening income distribution.

The purpose of this paper is to introduce applications of RUSMOD—a microsimulation model for fiscal incidence analysis in Russia- to answer questions about the distributive impact of fiscal reforms. RUSMOD combines household survey micro-data and fiscal policy rules to simulate the Russian tax-benefit system: the size and distribution of taxes collected and benefits paid, and the impact of the system on different population groups. Microsimulation models, such as RUSMOD, are habitually used in developed countries, and can be versatile budgetary policy tools. Using this model, we examine the tax-benefit system in the country. The impact of the system is measured across the income distribution, age groups, family types, localities, as well as across time.

RUSMOD can be used to further inform fiscal and social protection policies in Russia. Challenges to make taxes more progressive while raising revenues, to realign spending without increasing poverty and to consolidate and better target benefits are likely to increase in importance. RUSMOD, as part of a larger toolbox, is well-suited to contribute to answer this type of questions. This paper includes three applications of the current version of RUSMOD. First a description of the impact of the Russian tax-benefit system upon poverty and inequality. Second, an assessment of the distributional changes brought about by changes in tax and fiscal policy over the period 2010-2017. Third, a simulation of the impact on poverty and inequality of a hypothetical tax reform scenario. In this case, we investigate whether the existing system creates disincentives for formalization in terms of reducing disposable incomes, increasing poverty and inequality; and whether a hypothetical tax reform may be able to reduce the opportunity costs of formalization for informal workers, improve distributional outcomes

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<sup>1</sup> Gini index equal to Gini coefficient multiplied by 100.

<sup>2</sup> See Annex 1. Basic facts about the Russian tax-benefit system.

and increase fiscal revenues. Hence, the paper illustrates static, retrospective and prospective distributional analyses of tax-benefit policy in Russia.

The remainder of the paper is structured as follows. Section II describes the methodology of the microsimulation model RUSMOD and the input data. Section III presents the results of applying the RUSMOD for evaluating the distributional effect of the tax-benefit system in Russia including the intertemporal effects (baseline and retrospective scenarios). Section IV discusses the tax maneuver proposed by the Russian government and its expected impacts on formalization, fiscal revenues and income distribution (a prospective scenario). The final section concludes and offers an assessment of policies based on results from microsimulations.

## II. Methodology

### Description of the model

Microsimulation is primarily used as a technique of ex-ante policy impact assessment – i.e. predictions of the likely impact of a change in policy, prior to its implementation. However, ex-post policy evaluation – assessing the actual impact of a policy – is also possible. Microsimulation models (MSMs) seek to explain endogenous variables  $Y$  (e.g. disposable income) as a function of exogenous variables  $X$  (e.g. demographic and socio-economic characteristics of economic agents) and system parameters  $P$  (e.g. tax rules) (Immervoll & O'Donoghue, 2009). Both  $X$  and  $P$  may be modified so as to ascertain the impact on  $Y$  of a given policy or structural change. The models quantify the consequences, at the micro-level, of changes in tax-benefit policies, given that the characteristics of the underlying population remain constant, or vice versa, the consequences of changes in demographic and socio-economic characteristics given fixed tax-transfer policies. By taking full account of interactions between all elements of the tax-benefit system, and of the diversity of characteristics in the population, MSMs contribute to a better understanding of complex systems, such as contemporary welfare states.

Existing MSMs tend to differ in terms of whether they ignore or take account of behavioral responses of households to changes in policies. Static or arithmetic models, such as EUROMOD<sup>3</sup> and its spin-off RUSMOD, that ignore behavioral responses altogether, are adequate in evaluating the first-round distributional effects of changes in taxes and benefits under certain conditions. Namely if the reform is causing ‘marginal’ changes in the budget constraint faced by agents and all agents are optimizing under their sole budget constraint, i.e. all markets are perfect in the sense that agents are never rationed (Bourguignon & Spadaro, 2006). To study the second-round and long-term effects, arithmetic tax-benefit models need to be linked into behavioral models and general equilibrium models. The former allows individuals to change their behavior because of endogenous factors within the model and the latter allow for further changes in prices and behaviors of people and firms because of policy changes. The new simulated populations can be further used for the assessment of policy effects in the medium or long run using the static tax-benefit model. In case of the tax reforms considered in this paper, the second-round distributional effects can be significant, as one of the targets of the reform is stimulating the formalization of workers. This requires looking at the impact of the reform on changes in the individual’s informality status. Our paper includes static and behavioral responses to policy changes, and refrains from including full general equilibrium effects.

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<sup>3</sup> <https://www.euromod.ac.uk/>

RUSMOD is the first full-scale model in Russia that simulates most of the existing monetary tax-transfer policies implemented at the federal and regional levels for a nationally representative sample of the population. Currently, it covers two policy years – 2010 and 2017. RUSMOD is built on the EUROMOD platform. EUROMOD provides stand-alone and custom-built software for modeling tax-benefit systems. It features a specific modeling “language” (i.e. generic routines for performing various calculations to determine tax liabilities and benefit entitlements) and a user-friendly interface with extensive integrated help. EUROMOD software can be used in combination with other software (by supporting command-line execution), which enables the integration of EUROMOD calculations into other statistical packages or automated systems as well as linking EUROMOD tax-benefit models with other type of models (e.g. labor supply, general equilibrium and macro models). The software is free for non-commercial use.

EUROMOD has many spin-offs for non-EU countries, RUSMOD being one of them. EUROMOD is continually being improved and updated (Sutherland & Figari, 2013). The process of construction and development of RUSMOD is documented in Popova (2012) and Popova (2013). Using EUROMOD as a platform for constructing the Russian microsimulation model has a number of advantages: (1) it enables us to capture the full complexity of the Russian tax-benefit system, (2) it is flexible so that users are able to alter policy parameters and build in new policies, (3) it can be used for cross-national policy comparisons; (4) it can be used to disentangle the distributional impact of policy changes over time; (5) it can be used for “nowcasting” the income distribution; and (6) it can serve as a platform for analyzing behavioral changes due to policy reforms. These mark a difference with respect to previous fiscal incidence instruments built for Russia, including those based on the CEQ methodology (e.g. Lopez-Calva et al. (2017), Popova et al. (2018)).

The aim of building RUSMOD was to simulate as many existing policies as possible. However, due to the data constraints not all the taxes and social benefits are simulated by the model. First, some policies are beyond the scope of the model entirely or there are little or no data for that purpose. This refers to corporate taxes and in-kind benefits (such as free or subsidized health care, education and other social services). Theoretically these elements can be accounted for within the model framework using some imputation techniques. However, they have been ignored, at least temporarily, to limit complexity and to keep model building manageable. Second, due to lack of the relevant data in the survey many allowances could not be simulated. For example, contributory pensions are not simulated because the simulation requires information about the contribution record and wages over a person’s lifetime. If information about this type of allowances is collected in the data, they are included in the model, but the rules governing them may not be changed by users. Apart from all pensions, these include: a monthly cash payment, cash and near-cash categorical benefits (e.g. discounts for housing and utilities, transportation, medication, etc.), unemployment benefit, scholarships. Third, some benefits are accounted for in the original data, but cannot be separated from other payments. For example, a social supplement to pensions (a means-tested program which tops up incomes of non-working pensioners to a pensioner’s poverty line) is paid together with pensions and the recipients are not capable to tell how much they have received due to this particular program. Finally, there are some programs targeted at smaller groups of the population that neither can be simulated due to the lack of data, nor are available in the database, e.g. payments to families with foster/adopted children, payments to careers of the disabled relatives, child benefits for families of individuals who are in the military service, etc.

Figure 1 includes a diagram that illustrates this sequence of simulations in the model. The starting point of simulations in RUSMOD are net market incomes that are reported in survey data. However,

the fiscal incidence analysis requires gross incomes (i.e. incomes before any tax-benefit interventions), and these are derived by simulating personal income tax (PIT) and social insurance contributions (SIC) and adding those to net earnings and other taxable incomes. PIT needs to be simulated before SIC because SIC are levied on the PIT base. After gross incomes are computed, a special policy simulates unreported income, i.e. the difference between the reported household consumption expenditures and disposable income before simulations. This adjustment is switched on in the baseline, but can be switched off if needed. This needs to be done before social benefits are simulated, because we assume that unreported income might affect eligibility for some means-tested benefits. Social benefits are not subject to taxation in Russia; hence they can be simulated after direct taxes. Maternity related allowances are included in any income test, and hence have to be simulated first. Eligibility for means-tested benefits is derived by comparing disposable family/household income with the national poverty line (Minimum Subsistence Level), which has to be simulated before means-tested benefits. Means-tested benefits are simulated in that particular order because the income test for the state social assistance takes account of the child allowances, while the means-test for the housing subsidy includes the state social assistance. The indirect taxes (VAT and excises) are simulated last because they are levied on consumption expenditures, but their incidence is expressed relative to the disposable income.

It should be borne in mind that the level of precision in replicating the exact policy rules depends to a large extent on the level of control over the program by the federal authorities. The precise simulation of taxes is quite straightforward due to the transparency and high level of centralization of the Russian tax system. Contributory allowances paid from the Social Insurance Fund are simulated relatively precisely. As far as means-tested programs are concerned, the rules for housing subsidies (mainly subject to federal legislation) and child allowances (subject to regional legislation but with minimum standards set in the federal laws) are simulated more precisely compared to state social assistance which is provided completely at the discretion of regions and is simulated with simplifications and strong assumptions. All simulated programs are summarized in Table A-1 in the Annex.

Even though our simulations do not incorporate indirect effects, the analysis is not a mechanically applied accounting exercise. The incidence of taxes and benefits is modeled by their (assumed) economic rather than statutory incidence. For instance, we assume that individual income taxes and contributions (both by employer and the self-employed) are borne by labor in the formal sector and consumption taxes are fully shifted forward to consumers. In the case of means-tested benefits we account for their non-take up by potential beneficiaries.

**Figure 1: The RUSMOD policy spine (order of simulations in the model)**

Net market income (formal and informal earnings, investment incomes, private transfers and income from subsistence farming)
+ Simulated Employer and Self-employed social insurance contributions (SIC)
+ Simulated Personal income tax (PIT), incl. standard tax allowances
<b>=Gross market income</b>
- Simulated Employer and Self-employed SIC
- Direct taxes (simulated PIT, not simulated Social tax allowance for the previous year, property & vehicle taxes)
+ Not simulated benefits (public pensions, unemployment benefit, unified cash payment, housing privileges, scholarships)
+ Simulated not means-tested benefits (childbirth grant, maternity allowance, childcare allowance up to 1.5 years, compensation of childcare costs to parents, maternity capital)
+ Simulated means-tested benefits (child allowance up to 16(18) years, allowance for the third child up to 3 years, state social assistance, housing subsidy)
<b>=Disposable income</b>
- Value added tax (VAT)
- Excise duties on alcohol, tobacco and car fuel
<b>=Consumable or Post-Fiscal income</b>

The output of the model has been validated against official statistics (national accounts and administrative data) to assess the robustness of the model and its applicability for policy analysis, following the EUROMOD standards. To ensure comparability with the external sources some assumptions were used in the model. In general, although our modeling reflects as close as possible the existing statutory rules, in the baseline scenario we opted for computing economic rather than statutory incidence of taxes and benefits. Overall, the final estimates of poverty and inequality from RUSMOD are close to those based on national accounts; hence the model can be seen as a reliable tool for evaluating the current performance of the Russian tax-benefit system and the distributive impact of potential tax-benefit reforms.

### Input data

In order to be used within the EUROMOD framework, the input data set has to meet certain requirements (Figari, et al., 2007). A number of national household surveys have been considered for this purpose, but only one fulfilled all the essential criteria: the Russian Longitudinal Monitoring Survey of the Higher School of Economics (RLMS-HSE), an annual, nationally-representative survey that began in 1994 (see Table A-2 in the Annex for an overview of the input data). RLMS-HSE is a standard multi-topic survey with an extended set of information on economic well-being and health status. It collects individual level information on demographic characteristics, within-family relationships, labor market status, primary income by source, social benefits, expenditure, as well as other characteristics relevant for assessing tax liabilities or benefit entitlements. The survey satisfies international standards in terms of sampling and quality of data collection. The sample includes both cross-sectional and panel components. In geographical terms it covers 32 (out of 80+) regions, however it is not representative at the regional level, with the exception for the two biggest cities – Moscow and St. Petersburg.

To account for time inconsistency between the input data (2016) and the policy year (2017), updating (or uprating) factors are used. Each monetary variable is updated so as to account for changes that have taken place between the year of the data and the year of the simulated tax-benefit system. Updating factors are generally based on changes in the average value of an income component

between the year of the data and the policy year. The household and personal characteristics, such as housing type, employment status or demographic attributes, are constant in relation to the data year. Table A-3 in the Annex contains more information on the uprating factors.

### Limitations of the model

As every model, RUSMOD is not without its limitations, of which users should be aware. The following three main warnings are summarized below, along with the remedies typically applied: (i) RUSMOD is a static, partial equilibrium model; (ii) RUSMOD can never fully replicate the official statistics; and (iii) not all the programs could be fully simulated.

Being a static, partial equilibrium model, RUSMOD estimates only first-order effects of policy reforms on income distribution and fiscal outcomes, and generally does *not* take into account actions by economic agents taken in response, in order to adapt to changes. This problem, for example, can be acute if the *intention* of policy action is to actually influence behavior (for example, reduce the labor tax wedge in order to encourage formal employment). A solution could be to link the microsimulation model with a behavioral model, or assume some elasticity between variables of interest (Creedy & Duncan, 2002). One example is presented in section IV below, where we estimate the share of formalized workers after a tax reform using a behavioral model.

Models, such as RUSMOD, cannot fully replicate the official statistics. Comparing (“validating”) model output, such as the total amounts of tax receipts and spending on social transfers and inequality and poverty indices, with external data is a standard robustness check. In that regard, for example, the total amounts of public pensions are *over-reported* in RUSMOD by about 25 percent, expenditures on monthly cash payments are *under-reported* by 65 percent, while simulated PIT, SIC and VAT receipts are *under-estimated* by the model by 30-35 percent—vis-à-vis the official/external statistics. Gini index is estimated at 34.8 versus 41.0, the official (Rosstat) number. On the other hand, for several programs (e.g. unemployment benefit, maternity capital, child allowances up to 16 (18) years, housing privileges and subsidies) the match is quite accurate.

There are numerous reasons for the mismatch. First, a large share of incomes may remain unaccounted for in the survey due to non-response or underreporting. Also, some benefits (such as a monthly cash payment) may be paid together with other benefits (pensions from the Pension Fund, in this case), and not distinguished separately by recipients. On the other hand, official/external statistics may use other sources to compile the data—for example, in the case of the Gini index and national poverty headcount, Rosstat adjusts the survey number by imputing a top-end of the income distribution, which is believed to be missing from the data.

The mismatch with official data is not a fatal flaw. First, in general, surveys are used precisely to enrich and triangulate other statistics, and may not necessarily be a less accurate reflection of the real world. Second, the discrepancies are not large for EUROMOD standards. Nevertheless, the modeling approach in this paper attempts to reflect as close as possible the existing statutory rules, while at the same trying to compute economic rather than statutory incidence of taxes and benefits. In particular, we (i) excluded informal sector workers from simulations of PIT and SIC, (ii) imputed unreported income, and (iii) assigned non-take up probabilities for means-tested benefits.<sup>4</sup> Moreover, where appropriate, *changes* produced by the model, which are presumed to be more accurate, are used to

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<sup>4</sup> This model behavior can, of course, be switched off if the statutory incidence needs to be obtained. For example, in the ‘tax maneuver’ scenario some share of workers was formalized and then PIT and SIC were included in the model.

report results, rather than absolute values.<sup>5</sup> Other options that may potentially improve accuracy are: (i) using the official Rosstat household income survey; and (ii) using administrative data for microsimulation (Scandinavian countries do that). A more detailed discussion on RUSMOD validation can be found in Annex 2. Main assumptions and model validation.

Not all the programs could be (fully) simulated. First, some policies are beyond the scope of the model entirely—these include, for example, corporate taxes or in-kind benefits (such as free or subsidized health care, education and other social services).<sup>6</sup> Second, due to lack of information in the survey, a number of programs could not be simulated. For example, the simulation of contributory pension benefits requires information about the contribution record and wages over a person’s lifetime. Other such programs include: a *monthly cash payment*, *cash and near-cash categorical benefits* (such as discounts for housing, utilities, transportation or medication), *unemployment benefits*, and *scholarships*. Third, some benefits cannot be separated from other payments. For example, a *social supplement to pensions* is paid together with pensions and recipients are not able to tell them apart. Finally, there are some programs targeted at smaller groups of the population that can neither be simulated due to the lack of information in the survey, nor are available in the data set (for example, payments to families with foster/adopted children). Amounts for these programs are taken directly from the survey data, if available. The main drawback here is that the impact of parametric changes to these programs (for example, an increase in the statutory retirement age) cannot be simulated without strong assumptions.

### III. Performance of the Russian tax-benefit system

#### Baseline scenario: Actual incidence of the Russian tax-benefit system as of 2017

**The fiscal system in Russia reduces poverty by half and inequality by a third.** The poverty rate under the original income would be 34 percent and the Gini index 50 — this is reduced to 15 percent and 35 respectively (Table 1). The bulk of redistribution happens between the *original* and *disposable income*—that is, at the point of direct taxes/benefits, and before indirect taxes/subsidies. The inequality of *consumable income* (that is, after indirect taxes/benefits), increases somewhat (by 0.7 percentage points), reflecting the slight regressivity of the VAT.

**Table 1. The overall redistribution effect of the tax-benefit system in Russia**

	Original income	Disposable Income	Consumable Income
<b>Poverty rate, percent</b>	34.0	14.7	21.1
absolute change w.r.t original income, p.p.		-19.2	-12.9
relative change w.r.t. original income, percent		-56.7	-38.0
<b>Gini index</b>	49.6	34.8	35.5

<sup>5</sup> For example, a *change* in tax revenues as derived from the model can be applied to the actual budgetary data on revenues to obtain impact in absolute terms (such as trillions of rubles, or percent of GDP).

<sup>6</sup> In fact, in-kind programs typically play an important role in reducing inequality. In theory, these could be simulated using auxiliary models and/or strong assumptions. This is however not attempted here for reasons of tractability and simplicity, as well as in order to maintain the policy narrative in terms of monetary instruments. The role of in-kind programs in Russia was explored in Lopez-Calva et al. (2017) and Popova et al. (2018).

absolute change w.r.t original income, p.p.	-14.9	-14.1
relative change w.r.t. original income, percent	-30.0	-28.5

Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

Among the components of the tax-benefit system, the most important one is pensions. The marginal contribution<sup>7</sup> of pensions to poverty reduction is almost 26 percentage points, meaning that poverty more than doubles if pensions are excluded from income (Table 2).<sup>8</sup> The Gini index in this case almost returns to the level recorded at the *original* income. Other components have much smaller effect on poverty and inequality. The largest among these other components in terms of marginal contribution to poverty are social insurance contributions: poverty would have been lower by 4 percentage points if employees were able to retain their contributions. The second biggest marginal impact on inequality is coming from non-means-tested social assistance benefits.

**Table 2. Marginal contributions of key tax/benefit programs to disposable income, 2017**

	Disposable Income (DPI)	DPI plus SIC	DPI plus direct taxes	DPI minus pensions	DPI minus non- means-tested SA	DPI minus means-tested SA
<b>Poverty rate, percent</b>	14.7	11.0	12.6	39.3	16.8	15.0
absolute change w.r.t original income, p.p.		-3.7	-2.1	24.6	2.0	0.3
relative change w.r.t. original income, percent		-25.2	-14.2	167.1	13.9	1.8
<b>Gini index</b>	34.8	35.2	35.1	47.6	35.6	35.0
absolute change w.r.t original income, p.p.		0.5	0.3	12.9	0.9	0.2
relative change w.r.t. original income, percent		1.3	0.9	37.1	2.5	0.6

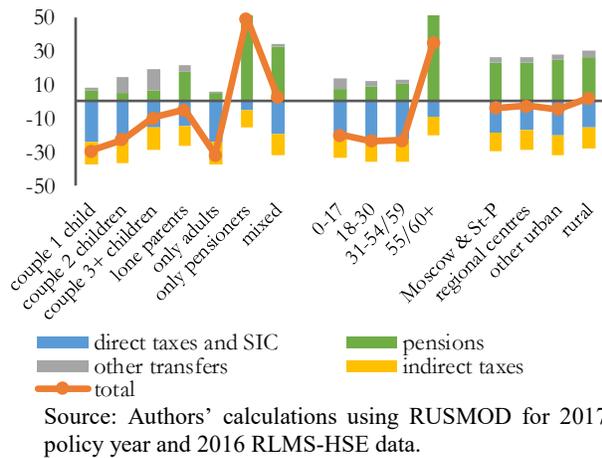
Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

Pensioner households benefit the most from the tax-benefit system. RUSMOD is able to disentangle fiscal impact by population groups and by programs. Given the importance of pensions, it is not surprising that retirees are the biggest beneficiaries of the system (Figure 2). Among age groups, this corresponds to the elderly above the statutory pension age (55/60+). Other family types are net payers to the system. For example, families with two or more children, and single parent households receive other direct transfers (child benefits), but in amounts insufficient to offset the taxes they pay.

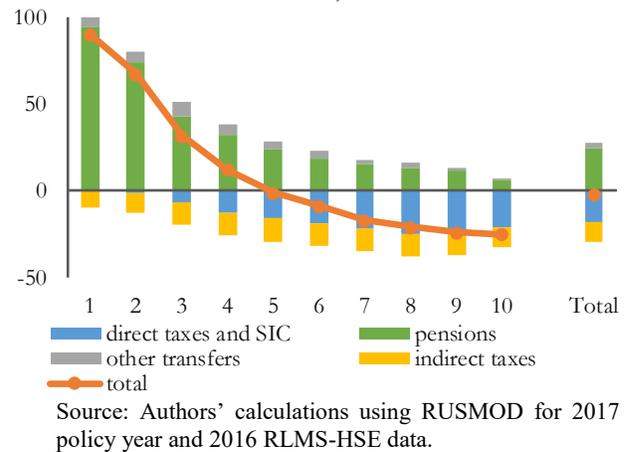
<sup>7</sup> The marginal contribution of a tax (or transfer) is calculated by taking the difference between the inequality indicator without the tax (or transfer) and with it (Lustig, 2018).

<sup>8</sup> Under the hypothetical case where pensions are excluded from the disposable income, but all other programs remain in place, the eligibility and amounts are recalculated as if there were no pensions.

**Figure 2. Effect of the 2017 tax-benefit system, by types of households, age groups and locations, change in consumable income, %**



**Figure 3. Effect of the 2017 tax-benefit system, by deciles of original income, change in consumable income, %**



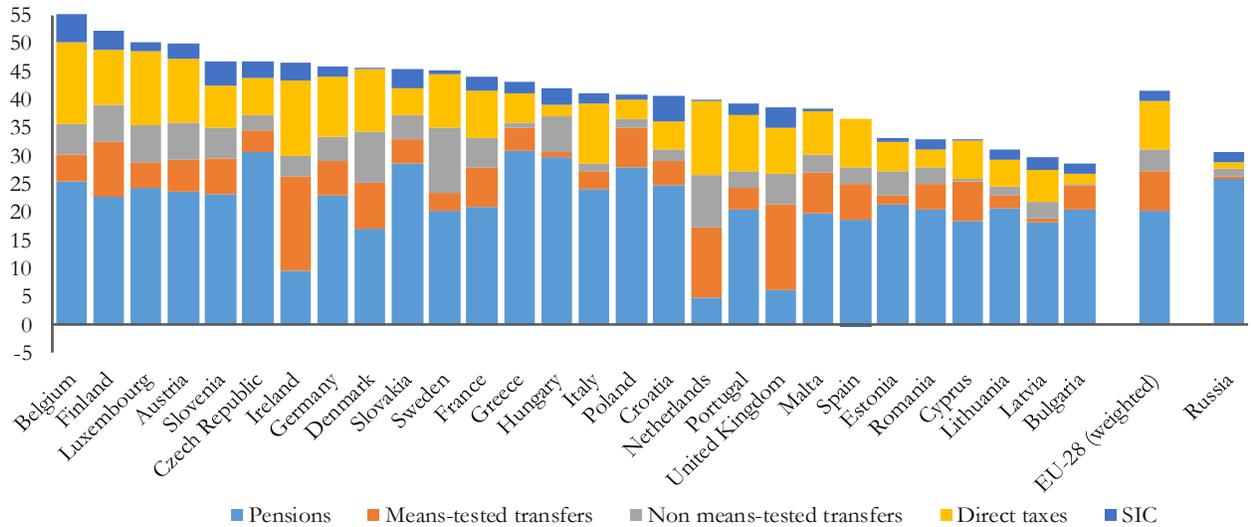
The fiscal system redistributes income from the upper to the lower part of the income distribution. When ranked by the original income, the bottom five deciles are net beneficiaries, while the top five deciles are net contributors to the system (Figure 3). At the bottom, government transfers (pensions in particular) are the main sources of income. The flat rate PIT limits the redistribution beyond a certain point: the richer seventh to tenth deciles appear to pay a similar share of income in direct taxes and social insurance contributions. The indirect taxation (VAT and excises) is slightly regressive, particularly beyond the fourth decile.

Finally, a preliminary analysis reveals that people in rural areas are net beneficiaries of the tax-benefit system in Russia, although the effect is small. One of the standard objectives of a fiscal policy is to help equalize living standards across the country. In principle, RUSMOD could be used to investigate this issue, except that the RLMS-HSE data are not available for all regions and the survey is not representative at the regional level. However, it is possible to divide population into broader groups by the level of urbanization (Figure 3). Under this breakdown the difference between how the fiscal system affects various types of localities appears not to be large—all groups benefit from direct transfers and pay relatively similar shares of their income in taxes. Overall, rural areas emerge with a slight net gain. More research into this topic on a representative sample is needed.

### *International comparison*

Results above notwithstanding, the Russian system of direct taxes and benefits is less redistributive than any system in the European Union. The redistributive power of the tax-benefit system in Russia is moderate, for international standards. The overall effect of direct taxes and transfers is close only to the least redistributive countries in the EU, such as Latvia and Bulgaria (Figure 4). Moreover, the Russian system is almost entirely dominated by pensions with other components having little effect on the reduction of the Gini index, while in many EU countries the direct taxes (mostly the progressive PIT) and means-tested benefits have a significant impact on reduction in income inequality.

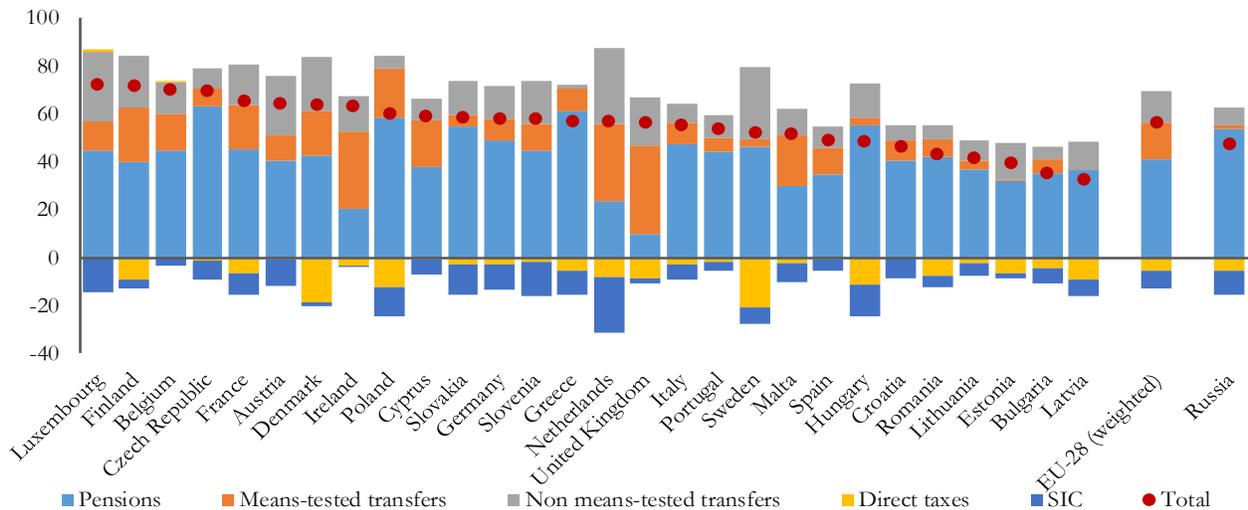
**Figure 4. Marginal contribution to reduction in the Gini index, percentage points**



Note: Incomes are equivalized using the (modified) OECD equivalence scale.  
 Source: EUROMOD-2017 statistics and authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

The effect of the tax-benefit system on poverty reduction in Russia is moderate compared with the EU countries. The relative poverty rate, defined for comparability with the EU method as a share of population with equivalized disposable incomes below 60 percent of the median income, drops by a half after fiscal interventions. While this is a less-than-average performance for EU standards, it is still better than nine of 28 EU countries (Figure 5). Again, this effect is almost entirely driven by pensions, whereas in the EU other benefits (means-tested and non-means-tested) have typically a significant effect on poverty reduction.

**Figure 5. Marginal contribution to reduction in poverty, percentage points**



Note: Relative poverty is defined as the share of population with income per adult-equivalent below 60 percent of the median disposable income. Incomes are equivalized using the (modified) OECD equivalence scale.  
 Source: EUROMOD-2017 statistics and authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

## Retrospective scenario: Policy changes during 2010-2017

Microsimulation models, such as RUSMOD, allow for isolating and estimating the effects of policy changes over time, separately from other factors. When comparing the distribution of income over time, there are several factors that might be driving changes in household nominal income (De Agostini, et al., 2014). First, the change could be driven just by the generalized inflation (that is, changes in the overall level of prices, including goods, services, wages, the exchange rate, etc.). Second, above that, there could be an increase in real incomes driven by economic growth, labor market improvements, etc. Finally, there could be changes in the fiscal system, such as changes in the tax rates or benefits program parameters, or entirely new programs. Separating and analyzing the latter component is clearly of particular interest.

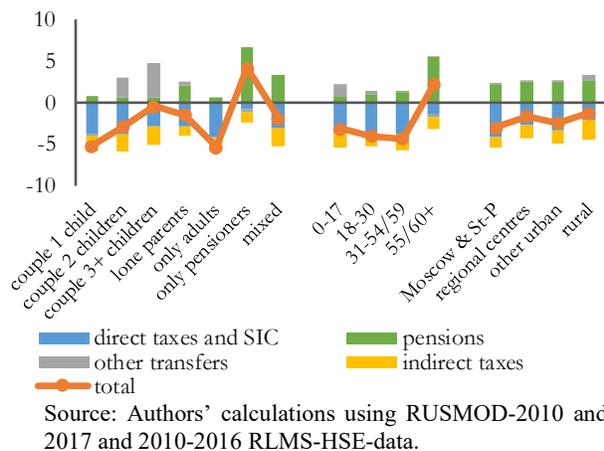
However, analyses of this sort have been hampered by problems of identification; specifically, a lack of counterfactual. Microsimulation models offer a straightforward solution: apply policy rules from year  $Y_0$  to data from year  $Y_1$  and compare the results with the actual outcomes in year  $Y_1$ —or vice versa. The difference is assumed to be due to fiscal policy changes between  $Y_0$  and  $Y_1$ .<sup>9</sup> In this note, the effects are calculated as the average of the two options (2017 system over 2010 data, and vice-versa), where all parameters are inflated/deflated by the growth in nominal market incomes (Annex 3. Intertemporal policy effects).

Major changes in the Russian tax-benefit system over the period 2010-2017 include: (i) a series of increases in public pensions, (ii) an increase in the marginal SIC rates for employers and the self-employed from 24 to 30 percent; (iii) changes in the standard tax allowances for PIT (while the marginal tax rate has remained unchanged); (iv) introduction of a new means-tested allowance for a third child under 3 years; and (v) introduction of a conditional means-tested cash transfer provided by regions (state social assistance on the basis of a Social Contract). Other changes were mostly parametric, such as updating federal benefit amounts each year for inflation. Even though the updating has stopped during the 2014-16 economic recession (most benefits remained “frozen”), the overall pension benefits were indexed much higher than inflation during 2010-17 – average pension increased in real terms by 70 percent between 2010 and 2017.

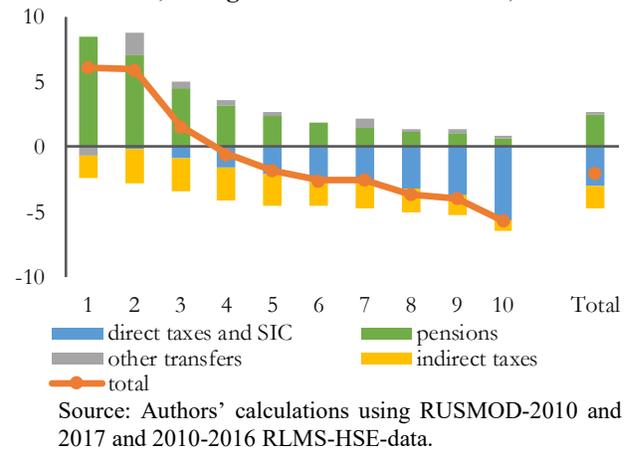
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<sup>9</sup> If tax-benefit parameters are generally updated (“indexed”) with (generalized) inflation, there is a need to scale either the monetary variables or fiscal parameters from  $Y_0$  to  $Y_1$  (or vice-versa) with that inflation rate.

**Figure 6. Policy effect 2010-17, by types of households, age groups and locations, change in consumable income, %**



**Figure 7. Policy effect 2010-17, by market income deciles, change in consumable income, %**



While the total increase in average consumable income in Russia over the period 2010-2017 was around 60 percent, the policy effect was negative on average. The average consumable income contraction driven by tax-benefit policy related factors in line with the above explained methodology contracted by 2 percent. Most of the population groups lost because of policy changes (Figure 6 and Figure 7). However, it turns out that the only big group that benefited from the changes in tax-benefit policies in Russia during 2010-2017 were pensioners.

As the largest increase in disposable income due to policy changes in Russia over his period can be attributed to a growth in pensions (by 4 percent in real terms), the only net beneficiaries of the policy changes over 2010-17 were people of the retirement age and households with pensioners (Figure 6 and Figure 7). As most of pensioners do not receive any market income, the beneficiaries of policy effect are mostly concentrated in the lower part of the distribution if deciles are defined based on the market income. Other types of households positively affected by changes in social transfers—but to a much smaller degree—were couples with two and three or more children. However, for these groups positive changes were offset by income reduction due to direct and indirect taxes. In terms of geographical location, rural areas had smaller negative effect than metropolis of fiscal policy change during the period under analysis (Figure 6).

## IV. Prospective scenario: A hypothetical tax change

### Background and the description of “tax maneuver 22/22”

Informal employment has been growing in Russia, similarly to other East European countries that have undergone transition to a market economy in early 1990s. Informal employment rates in Russia, according to Rosstat, were growing since the early 2000s through 2016, with a short period of stagnation or even decrease in the second half of the 2000s.<sup>10</sup> However, the aging population coupled

<sup>10</sup> Rosstat’s official measure of informal employment is estimated using the Labor Force Survey (LFS) and includes workers who are employed but not at an enterprise in their primary or secondary job. Informal employment rose from 13

with below replacement fertility rates is likely to increase the need for participation in the formal economy in the future decades. The sustainability of the welfare state, and the pension system in particular, will require activating economically inactive population and formalizing informal workers so that more workers contribute to the system by paying taxes and social security contributions.

The general literature on informality indicates several reasons why employers and workers might prefer to stay out of formal economy. These include strict regulations in the labor market (e.g. employment protection, minimum wages), complicated administrative procedures related to registering with tax authorities, high opportunity costs of entering formal employment due to high taxes or low social benefits, and weak law enforcement which allows for tax avoidance. Experience from developing countries shows that labor market regulations, however, have ambiguous effects on efficiency of labor allocation and workers' well-being. Betcherman (2014) summarizes these findings. According to this review, the efficiency effects of these regulations are usually small if significant and are not found in many cases. The distributional effects vary by groups of workers, they are usually positive for those who have formal jobs but might be negative for those who are not covered by labor market regulations. And those who are not covered are in many cases low-skilled, young workers and women – the groups that are more vulnerable in general.

Rigid labor market institutions could lead to higher informality, but previous studies suggest that a combination of weak enforcement and universal access to basic pension and health care are important drivers of informality in Russia. Contrary to the widely held belief that Russia had very rigid employment protection legislation (EPL), internationally comparable estimates showed that Russia's labor law is not particularly restrictive (Lehmann, et al., 2013). Notably, institutional stringencies appear to have shaped the labor market adjustment model observed in Russia. That is, the Russian labor market responds to output falls during economic crises more through lower wages and hours of work, rather than less employment. This is made possible by low minimum wages, low unemployment benefits and weak enforcement of wage and employment regulations, that altogether support flexible wages and flexible working hours (Gimpelson & Kapeliushnikov, 2011). The combination of a weak regulatory environment and low unemployment benefits makes informal employment an attractive option, especially in Russia where access to basic pension and health care is not dependent upon formal employment. Gimpelson and Kapeliushnikov (2014) argue that there is, in addition, a political economy challenge: as informality grows as a consequence of regulatory failure, a vicious circle of more regulatory failure and more informality leads to a break of the social contract.

The “tax maneuver 22/22” was a policy under consideration by authorities envisaging a shift from labor to consumption taxes. It recommended a simultaneous increase in the VAT rate from 18 to 22 percent and a reduction in the main (upper) social insurance contribution (SIC) rate from 30 percent currently to 22 percent.<sup>11</sup> This proposal was not implemented at this stage. Instead, the government decided just to increase the VAT rate by 2 percentage points in 2019. However, this policy change

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percent in 2002 to 19.5 percent in 2008, then fell to 16.4 percent in 2010, to rise again to 21.2 percent in 2016. Other surveys -using different definitions and sources of data- show qualitatively similar trends. See for instance, Kim at al. (forthcoming) and Lehmann and Zaiceva (2013).

<sup>11</sup> Another proposed change is the unification of the tax base for all SIC payments. We have run the scenarios including the tax maneuver and unification of the tax base; however, their results were not significantly different from the results obtained without the unification. For that reason, they were not included in the paper, but are available from the authors on request.

could be again considered in future. We also believe that this exercise is still informative to illustrate the possible effect of tax policy reform on informality in Russia.

Policies of that sort have often been recommended for many tax-benefit systems. In particular, as a way of boosting employment and encouraging labor market formalization (lower labor costs), improving fiscal revenues (VAT is often believed to be more difficult to avoid), and improving external competitiveness (by making exports cheaper and imports more expensive), if the exchange rate channel does not work. Several EU countries have recently implemented, or attempted to implement, such types of tax changes (Germany 2007, Hungary 2009, or France 2012).

Tax shifts often elicit behavioral responses, which are difficult to model. Indeed, one of the objectives of the tax maneuver is to induce movements from the informal to formal economy, and bring additional revenues to the budget (offsetting losses due to lower tax rates) or additional benefits to the population, or both. Static tax-benefit models, such as EUROMOD and its spin-off RUSMOD, are not designed to specifically address behavioral responses. For this paper, RUSMOD was modified to simulate transitions between formal and informal employment. There are two mechanisms to implement this: (i) based on random selection of individuals undergoing formalization and (ii) based on a behavioral model that estimates the probability of formalization based on a wage equation and the socio-demographic characteristics of workers.

In the equilibrium, gains or losses due to changes in labor taxes are shared between workers and employers, regardless of the statutory incidence. Under statutory rules currently in place, all SIC in Russia are paid by employers on behalf of their employees, hence changes in rates should not affect workers' net salaries. However, changes in SIC may lead to changes in labor contracts, and consequently affect the wages received by workers. Similarly, changes in PIT may lead to changes in labor supply, which also affect equilibrium wages in the market. In reality, whether workers lose or gain depends on the relative elasticity of labor demand and supply with respect to wages and some other technical conditions.<sup>12</sup> Evidence suggests that at least part of the reduction in labor taxes is shifted to workers, but this effect is weaker for low-skilled workers (Pages, 2017), (Betcherman & Pages, 2009).

To cover the range of possible outcomes we perform the simulations under the following assumptions: (i) Scenario A in which there is no transmission (pass-through) of SIC rate reduction to workers (that is, economic incidence of PIT and SIC does not fall on the employee), and (ii) Scenario B in which there is a full pass-through (economic incidence of PIT and SIC falls on the employee). We also simulate an intermediate case (iii) Scenario C when economic incidence coincides with statutory one (economic incidence of PIT falls on employee and the incidence of SIC falls on employer).<sup>13</sup>

## **Findings of the previous literature and definitions of informality in RUSMOD**

There is rich experience of applying microsimulation models in the ex-ante and ex-post assessments of the distributional and fiscal outcomes of tax-benefit reforms across the world. Many of these

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<sup>12</sup> The difference between statutory incidence (who is legally responsible for paying the tax) and economic incidence (whose welfare is reduced because of a tax) is a key concept in welfare economics and tax incidence analysis. Economic analysis of tax incidence takes into consideration wage elasticities of labor demand and supply, elasticity of substitution in production, as well as considerations on whether the market under study is competitive or not, the economy is open or closed, and welfare is gauged over the short or long-term (see (Metcalf, 2018) and references therein).

<sup>13</sup> These are polar cases that facilitate modeling and define upper/lower bounds of impacts. Most likely, the economic incidence of each tax is partly shared by firms and workers.

studies are based on EUROMOD, the tax-benefit model for EU-28, and its spin-off models for non-EU countries.

The paper by Paulus et al. (2009) uses EUROMOD to assess the impact of the flat PIT reform on fiscal revenues and on the redistribution of individuals' incomes in three EU countries. They show that the most radical scenario with a flat tax rate of 20 percent and no tax concessions (apart from exempting pensions from tax) could result in a dramatic increase in inequality and poverty because most of the cost of the reform would be borne by lower income groups.

Using a EUROMOD spin-off for Serbia (SRMOD), Randelovic & Zarkovic Rakic (2013) simulate the distributional effects of changing a SIC formula in Serbia, specifically the abolishment of a mandatory minimum SIC, which in theory should increase incentives for formal employment. Authors indeed find a reduction in average and marginal tax rate as a consequence of this reform, and therefore an improvement in incentives for formal employment, but show that this does not necessarily lead to an increase in labor supply per se. The distributional impact of the reform is assessed as positive (i.e., reductions in poverty and inequality) but rather small. The abolishment of a minimum SIC payment is especially beneficial for lower income workers.

RLMS-HSE captures informal employment at the main job, the additional (second) job and from occasional ad hoc jobs.<sup>14</sup> In RUSMOD informal workers were excluded from simulations of SIC, PIT and earnings-related benefits. In order to simulate SIC, the model needs to distinguish between employees and the self-employed/individual entrepreneurs because the formula of contributions and tax base are different for these two categories. The simulation exercise excludes the self-employed workers because the tax maneuver would not affect the taxation mechanism for this group. Table A-10 shows how the informality status was defined for these two categories of workers using the survey questions. Since one individual may have more than one job, some individuals may be classified as both employee and the self-employed and receive both formal and informal income at different jobs.

For this study, we opted for a wide definition of informality where a worker is defined as informal if it has any of the following jobs: (i) a main job without contract, or with contract but part of its payment is not subject to SIC and PIT (i.e., envelope payments); (ii) a second job as self-employed or in the corporate sector but without contract, or (iii) an occasional job without a labor contract. According to RLMS data, as of 2016, the share of informally employed amounted to 19.8 percent at the main job and 44.2 percent at the second job, among employees. Among the self-employed, 63 percent were classified as informal workers at the main job. Among those who reported occasional self-employment 89 percent were informal. According to this definition, 32.6 percent of all jobs (either primary, secondary or occasional) are informal. If focusing on workers, rather than jobs, 33.4 percent

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<sup>14</sup> In this study we focus only on informal employment, not the informal sector. Hence, accounting and behavioral simulations focus on individual workers and their jobs, not on firms. This is due to our use of a household survey, rather than firm data, as well as our methodological approach. An analysis of informal firms would require different data sources and methods. For an analysis of firms and informality, see Galiani & Weinschelbaum (2012) and Ulysea (2018). For an explanation of the distinction between informal employment and informal sector, see Chapter 25 in "Informal aspects of the economy" in *System of National Accounts 2008* (United Nations Department of Economic and Social Affairs, 2010) and Chapter 8 "Employment in the Informal Economy" in *Key Indicators of the Labour Market 2015* (ILO, Geneva, 2016).

of workers hold at least one type of informal job and 30.8 percent hold no formal job at all (see Table A-11 for more details). If focusing only on the primary job, the informality rate is 24.8 percent.<sup>15</sup>

### **First-order effects of the tax maneuver on employment, income distribution and fiscal budget based on random allocation**

Our analysis focuses on potential avenues for improving the distributional and fiscal outcomes due to formalization. It is important to note that we only consider the outcomes of formalization of employees because they are the target group of the hypothetical tax reforms initially proposed by the government. The treatment of the self-employed in the tax-benefit system is different from that of employees and it is not subject to reform under the hypothetical policy proposal analyzed in this paper. First, we show how the tax and benefit policies that are currently in place affect the distributional outcomes of formal and informal workers. This is intended to serve as a reference point for the subsequent analysis of policy changes. Second, we assess the first-order effects of hypothetical scenarios assuming formalization of a random selection of subsets of informal workers due to the tax maneuver, on income distribution and fiscal budget. Third, we model first-order effects of the tax maneuver on informality but using a behavioral model that selects who and how many informal workers actually become formal and estimate the impact of these changes on income distribution and the fiscal budget.<sup>16</sup>

We propose six hypothetical scenarios to evaluate the first order distributional and fiscal impact of the tax maneuver. The simulated scenarios are summarized in Table 3. The scenarios vary by (1) potential changes in the tax system and in formalization (rows 1-2 in Table 3), and (2) assumptions about the incidence of taxation (columns A-B-C in Table 3). In all the scenarios VAT burden is assumed to be shifted to consumers, the non-take up ratio of means-tested benefits and unreported incomes are assumed to be constant. Under each scenario of this static micro-simulation we tested several options of the degree of formalization by hypothesizing transitions of varying percentages of informal employees into formality: from 0 percent (which implies that the tax maneuver has no impact on formalization), to 10 percent, 20 percent and 50 percent<sup>17</sup> of all informal workers (i.e., full formalization). The individuals undergoing transitions have been selected randomly from the pool of informal workers.

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<sup>15</sup> This definition of informality differs from the definition used by Rosstat. The official Rosstat definition of informal employment is estimated using the Labor Force Survey (LFS) and includes workers that are employed but not at an enterprise in their primary or secondary job. No reference is made to envelop payments. As of 2016, the informality rate according to Rosstat is 21.2 percent.

<sup>16</sup> Given the definition of informality of this exercise, turning formal means the worker has no earnings that do not pay SIC and PIT. Namely, if he/she had a share of earnings as envelope payments or had no contract, becoming formal means having a work contract and no envelop payments, so 100% of earnings are subject to SIC and PIT. The simulation exercise excludes the self-employed workers because the tax maneuver would not affect the taxation mechanism for this group.

<sup>17</sup> Formalization of 30%, 40% and 100% of informal workers were estimated too. The four abovementioned were selected to demonstrate for the following reasons: 0%, 10% and 20% are the most realistic cases, that one should expect as reaction for tax maneuver (based on probabilistic simulations described further) and 50% leads to a fiscally neutral effect under Scenario 2.

**Table 3: Simulated scenarios of changes in the tax system and formalization given different assumptions about tax incidence**

Reform options:	Assumptions about the incidence of PIT and SIC:		
	Tax burden (SIC and PIT) is not shifted to employees	Tax burden (SIC and PIT) is fully shifted to employees	SIC burden is not shifted to employees, PIT burden is shifted to employees
No tax changes & Formalization	Scenario 1A. No changes in SIC/VAT rates; Economic incidence of PIT and SIC does not fall on employee.	Scenario 1B. No changes in SIC/VAT rates; Economic incidence of PIT and SIC falls on employees.	Scenario 1C. No changes in SIC/VAT rates; Economic incidence coincides with statutory one: PIT falls on employees, SIC falls on employer.
Tax maneuver (SIC reduction and VAT increase) & Formalization	Scenario 2A. SIC reduced to 22%, VAT increased to 22%; Economic incidence of PIT and SIC does not fall on employee.	Scenario 2B. SIC reduced to 22%, VAT increased to 22%; Economic incidence of PIT and SIC falls on employees.	Scenario 2C. SIC reduced to 22%, VAT increased to 22%; Economic incidence coincides with statutory one: PIT falls on employees, SIC falls on employer.

Notes: VAT burden is assumed to be borne by consumers in all the scenarios.

These scenarios will lead to different outcomes in terms of distribution of income and the fiscal budget. In type A scenarios, economic incidence of SIC and PIT does not fall on employees. This implies that labor demand is relatively more inelastic than labor supply and, hence, employers cannot induce lower wages (in form of lower take-home pay to employees) and have instead to accept higher labor costs to pay for SIC. In contrast, type B scenarios assume that economic incidence of SIC and PIT falls on employees. Therefore, here we assume that labor supply is relatively more elastic than labor demand and workers have to accept a lower take-home pay (and employers do not have to accept higher labor costs) to pay for SIC.<sup>18</sup> Finally, type C scenarios assume that economic incidence coincides with the statutory one. Namely, the SIC burden falls on employers (i.e., employers should accept higher labor costs to pay for SIC), and the PIT burden falls on employees (i.e., employees have to accept a lower take-home pay to pay for PIT).

The distributional and fiscal consequences of these three scenarios are measured for two policy options. In reform 1, we focus on possible effects of formalization of all employees if the tax system remains unchanged. This exercise illustrates what would be the income distribution and budget situation if there were no informal employment under the current tax system. It can also be interpreted as a situation in which stricter enforcement of the legislation makes sure that workers formalize (i.e., informal salaried workers have a contract and no envelop payments). In reform 2 we gauge the impact of the implementation of the ‘tax maneuver 22-22’, hypothesizing that it may result in different degrees of formalization as a self-response of employees (and firms) to tax incentives. The maneuver consists of a simultaneous reduction in SIC rate from 30 to 22 percent (due to pension SIC) and an increase in VAT rate from 18 to 22 percent. The reform is intended to be ‘budget neutral’ by its developers. The lost fiscal revenues due to SIC reduction should be compensated through two

<sup>18</sup> In the case of PIT, the argument involves wage elasticity of labor supply and elasticity of substitution in production, between labor and other factors of production. Similarly, if labor supply is very inelastic (or if elasticity of substitution between labor and other factors is very high), most of the tax change will be borne by the worker (see (Kubik, 2004) for a derivation using skilled and non-skilled labor in a competitive output market). Hence, in the presence of a tax hike, workers change little their labor supply (and firms can substitute easily) and then workers bear the burden of taxation and have to accept a reduction in take-home pay. In the case of a tax reduction, workers benefit from a reduction in tax burden and higher take-home pay.

channels. One of them is the above-mentioned increase in indirect consumption taxes. Second, the reform is expected to enlarge the SIC tax base due to formalization of workers.

Our analysis accounts for two channels by which formalization could affect well-being. The first channel refers to changes in after-tax wages (i.e., take-home pay), due to changes in SIC and the decision to become formal. The second channel refers to earnings-related and means-tested programs and payments in VAT for consumption goods.

In the first channel, changes in take-home pay vary according to assumptions of tax incidence. The economic incidence of the direct taxes (PIT and SIC in the case of this model) is defined by the parameters  $\alpha$  and  $\beta$ , which are assumed equal to 1, if economic incidence falls on the employee, and equal to 0 if employees do not bear the burden of taxation. Formally, after-tax wages are:

$$W^a = W^b - \alpha * s * W^b - \beta * t * W^b = W^b * (1 - \alpha * s - \beta * t).$$

where,  $\alpha$  stands for share of SIC economic incidence that falls on employee;  $\beta$  for share of PIT economic incidence that falls on employee,  $s$  is the SIC effective rate,  $t$  the PIT effective rate, and  $W^b$  stands for the equilibrium wage.

Assuming equilibrium wages equal labor productivity in competitive markets, and that labor productivity does not change because of changes in taxes,<sup>19</sup> we then postulate:

$$W^b_1 = W^b_0$$

$$W^a_1 * (1 - \alpha * s_1 - \beta * t_1)^{-1} = W^a_0 * (1 - \alpha * s_0 - \beta * t_0)^{-1}$$

but since  $t_1 = t_0 = t$  (i.e., PIT rate is not affected by the ‘tax maneuver’ reform), then we can simplify:

$$W^a_1 * (1 - \alpha * s_1 - \beta * t)^{-1} = W^a_0 * (1 - \alpha * s_0 - \beta * t)^{-1}$$

where the subscript indices stand for 0, wage/taxes before the reform and formalization, and 1 – wage/taxes after the reform and formalization.

The wage outcome after the reform will depend on the informality status of the worker. If the employee remains formal after the reform (Formal – Formal), the net wage after the reform would be:

$$W^a_1 * (1 - \alpha * s_1 - \beta * t)^{-1} = W^a_0 * (1 - \alpha * s_0 - \beta * t)^{-1} \rightarrow W^a_1 = W^a_0 * (1 - \alpha * s_1 - \beta * t) * (1 - \alpha * s_0 - \beta * t)^{-1}.$$

if worker was informal before and remains informal after the reform (Informal – Informal), the net wage would not change (that is because  $s_0 = s_1 = 0$  and  $t = 0$ , no matter  $\alpha$  or  $\beta$ ):

$$W^a_1 = W^a_0.$$

and, if the worker was informal before but became formal after the reform (Informal – Formal), the net wage would be:

$$W^a_1 * (1 - \alpha * s_1 - \beta * t)^{-1} = W^a_0 \rightarrow W^a_1 = W^a_0 * (1 - \alpha * s_1 - \beta * t).$$

Finally, this should be combined with the scenario assumptions discussed before (see Table 4). Under the economic incidence assumptions, we consider three polar cases: scenario A,  $\alpha = \beta = 0$  (i.e.,

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<sup>19</sup> In general, changes in labor productivity can be expected if workers change firms. However, this exercise assumes that individuals do not change firms, but simply that their envelope payments (or wages under no contract) become fully formal and then taxable (see footnote 8). In this paper the decision of the worker to formalize or to stay informal is modeled as if the formalization would take place within the same firm. Change to another firm in search for higher earnings in the formal sector might be another important factor, especially given a growing wage gap between formal and informal sectors in Russia. Kim et al. (forthcoming) document a recent and statistically significant wage gap between formal and informal workers. But we do not model employment mobility or firm behavior in this exercise.

economic incidence of PIT and SIC does not fall on employees); scenario B,  $\alpha = \beta = 1$  (i.e., economic incidence of both PIT and SIC fully falls on employees); and scenario C,  $\alpha = 0, \beta = 1$  (i.e., economic incidence coincides with statutory, SIC falls on employer, PIT falls on employees). In some cases, net wages remain unchanged, in others they increase (scenario B for those who remain formal) and in others they fall (scenarios B and C for those who formalize).

The second channel refers to changes in public benefits and the amount of VAT paid. Changes in benefits may lead either to increase or decrease of the disposable income as they could be driven by two reasons: (i) households may lose gain/eligibility if the formal income decreases/increases (for example, for means-tested *state social assistance*) or the amount might change if it depends on the previous formal income (for example, for *maternity leave allowance*). The VAT is assumed to be always paid by consumer and the changes in the disposable income are directly transferred to changes in expenditures that are taxed with higher VAT rate. That is why it always leads to reduction in consumable income.<sup>20</sup> The final change in consumable income depends on combination of all abovementioned factors and could be positive, negative or neutral depending on the characteristics of the specific household. It is also worth mentioning that all numbers produced by RUSMOD are in per capita terms, meaning that all individual incomes are summed up within the household and divided by the household size. That is why even not working individuals may benefit from changes in wages and/or benefits that are assigned to other members of the household. The second channel may, or may not, partly compensate for the negative effect of the first one since people who will start paying higher direct taxes will have smaller disposable income, and, therefore, may become eligible for some means-tested programs.

**Table 4: Impact on net wages by simulation scenario**

Reform options: Informality Status:	Assumptions about the economic incidence of PIT and SIC:		
	A. SIC and PIT not on employees	B. SIC and PIT on employees	C. SIC on employers, PIT on employees
1. Formal - Formal	$W_1^a = W_0^a$ No changes in net wages.	$W_1^a = W_0^a \frac{(1-t-s_1)}{(1-t-s_0)}$ Net wage grows due to reduction in SIC rate.	$W_1^a = W_0^a$ No changes in net wages.
2. Informal - Informal	$W_1^a = W_0^a$ No changes in net wages.	$W_1^a = W_0^a$ No changes in net wages.	$W_1^a = W_0^a$ No changes in net wages.
3. Informal - Formal	$W_1^a = W_0^a$ No changes in net wages.	$W_1^a = W_0^a * (1 - t - s_1)$ . Reduction in net wages due to obligation to pay SIC and PIT.	$W_1^a = W_0^a * (1 - t)$ . Reduction in net wages due to obligation to pay PIT.

The simulated changes in the distributional and budgetary outcomes under reform 1 scenarios are shown in Table 5. Quite predictably, all reform 1 scenarios under which some or all workers formalize and start paying SIC and PIT, keeping the existing tax-benefit rules, would be beneficial for the budget, irrespective of the assumptions about the distribution of tax incidence. The maximum budget increase among those reported below (in case of transition of 50 percent of informal workers to formality) would be quite significant, varying from 0.9 percent of the GDP under scenario B, to 1.0

<sup>20</sup> The distinction between disposable and consumable income comes from Lustig (2018). See Figure 1.

percent under scenario C, and 1.1 percent under scenario A. At the same time, unless we assume that taxes have no incidence upon employees (scenario A), the distributional outcomes would suffer due to formalization, but to a moderate degree as far as the population in general is concerned. Under scenario B, full formalization would result in a 1.4 percent reduction in mean consumable income of the population and subsequently a slight increase in poverty and inequality. Yet for the target group (the formalized employees) the reduction in income would amount to 17.2 percent and poverty rate would go up by 16.6 p.p. Full formalization under scenario C would have similar consequences, although the negative impact on the population and the target group would be much smaller than in scenario B because the workers are assumed to bear only the burden of PIT.

**Table 5: Simulated changes in indicators of income distribution and fiscal budget, reform 1 scenarios**

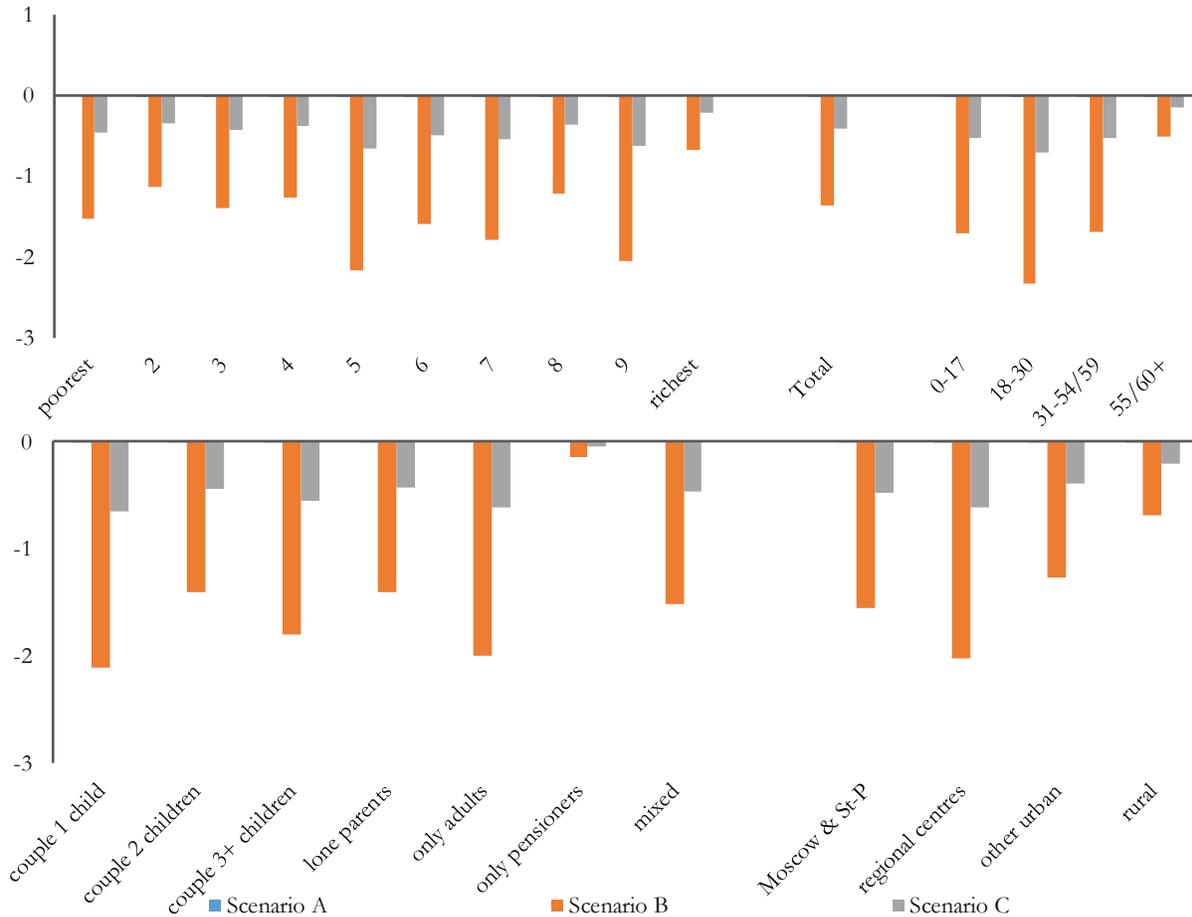
	Formalization rate:			
	0%	10%	20%	50%
Scenario 1A				
Income of 1st decile, %	0.0	0.0	0.0	0.0
Income of the formalized, %	0.0	0.0	0.0	0.0
Income total, %	0.0	0.0	0.0	0.0
Absolute poverty rate of the formalized, p.p.	0.0	0.0	0.0	0.0
Absolute poverty rate, p.p.	0.0	0.0	0.0	0.0
Gini index, p.p.	0.0	0.0	0.0	0.0
Total budget balance, % of GDP	0.0	0.2	0.4	1.1
Scenario 1B				
Income of 1st decile, %	0.0	-0.3	-0.6	-1.5
Income of the formalized, %	0.0	-16.4	-16.2	-17.2
Income total, %	0.0	-0.3	-0.6	-1.4
Absolute poverty rate of the formalized, p.p.	0.0	14.9	13.4	16.6
Absolute poverty rate, p.p.	0.0	0.3	0.6	1.4
Gini index, p.p.	0.0	0.1	0.1	0.4
Total budget balance, % of GDP	0.0	0.2	0.4	0.9
Scenario 1C				
Income of 1st decile, %	0.0	-0.1	-0.2	-0.5
Income of the formalized, %	0.0	-5.1	-5.0	-5.3
Income total, %	0.0	-0.1	-0.2	-0.4
Absolute poverty rate of the formalized, p.p.	0.0	5.1	4.1	3.2
Absolute poverty rate, p.p.	0.0	0.1	0.2	0.2
Gini index, p.p.	0.0	0.0	0.0	0.1
Total budget balance, % of GDP	0.0	0.2	0.4	1.0

Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

Formalization is costly for workers if the economic incidence of direct taxes falls on them. Figure 8 illustrates the outcomes of reform 1 for different types of socio-demographic groupings. In case of random formalization of 50 percent of informal workers, the transition to formality is costly for the workers in most cases. There are no losses for workers under scenario A, because SIC is assumed to have no incidence of workers, so changes in it do not affect their take-home pay. In scenario B, where workers are responsible for paying all additional SIC and PIT due to formalization, their new gross and net earnings decrease substantially. The additional social benefits cannot compensate the higher taxes, which is why the net effect is negative and especially so in the middle of the income distribution. Scenario C represents the intermediate case, where workers bear a part of tax burden (PIT, but not SIC), which yields a lower negative effect. The negative effects of scenario B are similar

across socio-demographic groups, except for pensioners, the elderly and the rural population which show a smaller negative impact of formalization, mostly because they are exempt from taxation (pensioners) or are less likely to be formal (rural population).

**Figure 8: Reform-1: Formalization of 50 percent of informal employees, no changes in taxation. Percentage change in consumable income w.r.t. no-reform scenario by decile, age group, household and location types.**



Sour: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

Table 6 summarizes the changes in the distributional and budgetary outcomes for reform 2 scenarios (i.e., the ‘tax maneuver 22/22’). First, if the informality rate remains unchanged (nobody formalizes), the tax maneuver would have a negative effect on the budget, resulting in a budget deficit increase equal to 0.9 percent of the GDP under scenarios A and C, and to 0.6 percent of the GDP under scenario B. As far as the population is concerned, the proposed tax changes are beneficial if we assume that the tax burden is fully shifted to workers (scenario B) and negative if the burden of labor taxes is partially or not borne by employees (scenarios C and A). In the latter case households lose due to increases in VAT, while under scenario B this loss is being offset by the reduced SIC rate. Second, Table 6 shows that formalization could indeed compensate for the fiscal losses due to the tax maneuver. However, under all scenarios, the budget starts to gain when at least 50 percent of all informal employees are moved to formal economy, which is relatively a high response to the tax maneuver (approximately 4.5 million people). However, a 50 percent formalization scenario seems to have little negative income effect only if we assume that all taxes are shifted to employees (scenario

B), while under scenarios A and C households would lose 1.6 and 2.0 percent of their consumable income, respectively. In all the three scenarios, those who formalize experience a decline in incomes and higher poverty rates. We can also see that the target group (the informal employees) would still face high opportunity costs of formalization, although those will be partly offset by the tax maneuver. In case of the tax maneuver followed by 50 percent formalization, under scenario B average incomes of the formalized are lower by 14.2 percent compared to the baseline scenario and their poverty rate is higher by 9.8 p.p. than in the baseline, which are lower losses than in the case of enforced formalization (see lines 2 and 3 of panel 2B of Table 6).

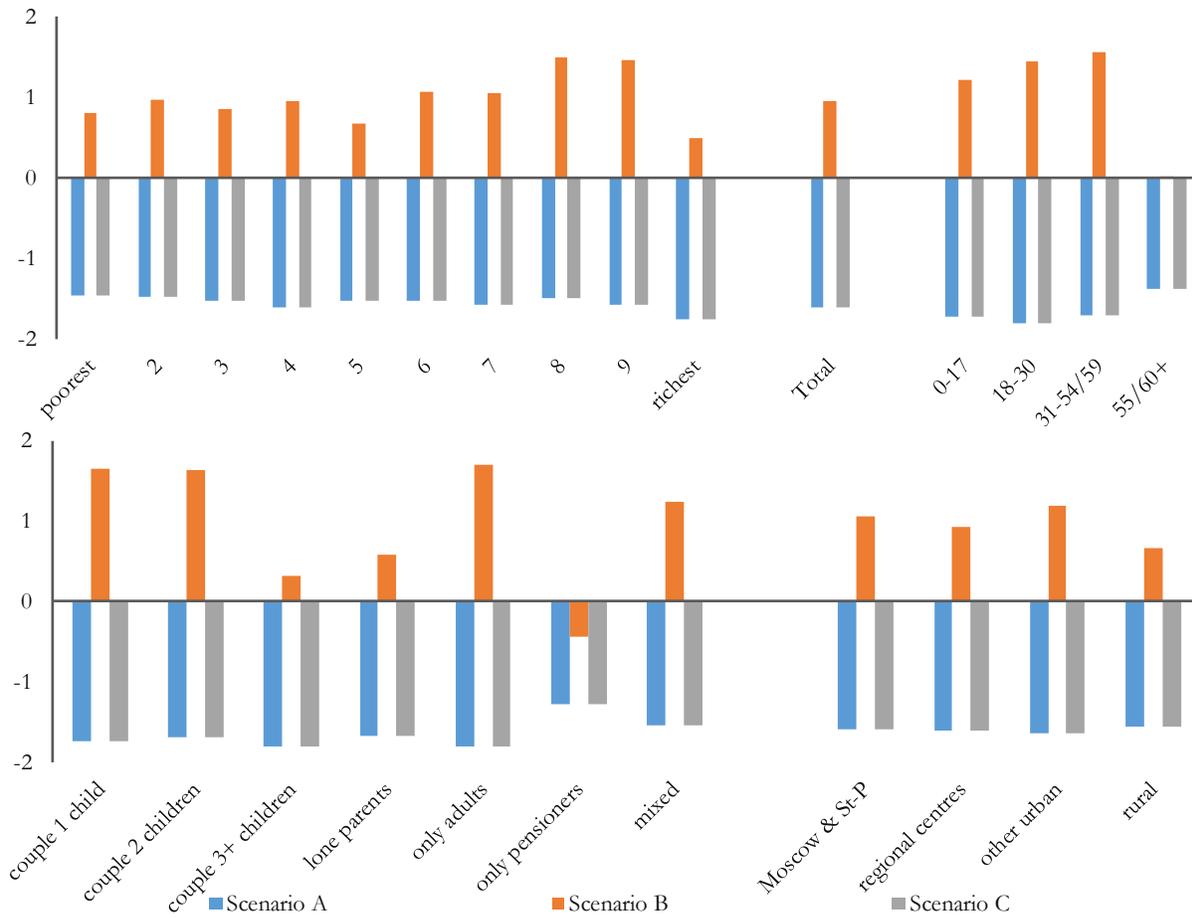
**Table 6: Simulated changes in indicators of income distribution and fiscal budget, reform 2 scenarios**

	Formalization rate:			
	0%	10%	20%	50%
	Scenario 2A			
Income of 1st decile, %	-1.5	-1.5	-1.5	-1.5
Income of the formalized, %	0.0	-1.8	-1.9	-1.8
Income total, %	-1.6	-1.6	-1.6	-1.6
Absolute poverty rate of the formalized, p.p.	0.0	1.9	1.9	1.8
Absolute poverty rate, p.p.	0.8	0.8	0.8	0.8
Gini index, p.p.	0.0	0.0	0.0	0.0
Total budget balance, % of GDP	-0.9	-0.7	-0.5	0.0
	Scenario 2B			
Income of 1st decile, %	0.8	0.6	0.3	-0.4
Income of the formalized, %	0.0	-13.4	-13.3	-14.2
Income total, %	0.9	0.7	0.5	-0.2
Absolute poverty rate of the formalized, p.p.	0.0	11.6	9.1	9.8
Absolute poverty rate, p.p.	-0.2	0.0	0.2	0.6
Gini index, p.p.	0.0	0.0	0.1	0.3
Total budget balance, % of GDP	-0.6	-0.5	-0.3	0.2
	Scenario 2C			
Income of 1st decile, %	-1.5	-1.5	-1.6	-1.9
Income of the formalized, %	0.0	-6.8	-6.7	-7.0
Income total, %	-1.6	-1.7	-1.8	-2.0
Absolute poverty rate of the formalized, p.p.	0.0	5.1	4.1	3.7
Absolute poverty rate, p.p.	0.8	0.9	0.9	1.0
Gini index, p.p.	0.0	0.0	0.0	0.1
Total budget balance, % of GDP	-0.9	-0.7	-0.5	0.0

Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

Figure 9 shows the results of reform 2 with the assumption that nobody formalizes by income deciles and socio-demographic groups. In this case the distributional impact of the tax maneuver completely depends on our assumptions about the economic incidence of SIC. If it falls on workers (scenario B), the benefit from SIC reduction is higher than the additional burden of higher VAT, and is beneficial for all the income deciles. The relative effect is of similar size across the distribution. Not surprisingly, households with fewer children and adult only households benefit the most. The situation reverts if the economic incidence of SIC reduction does not favor employees (scenarios A and C). In this case, households are assumed to carry the burden of higher VAT and no additional benefit due to lower SIC, which results in a negative effect for all the population subgroups.

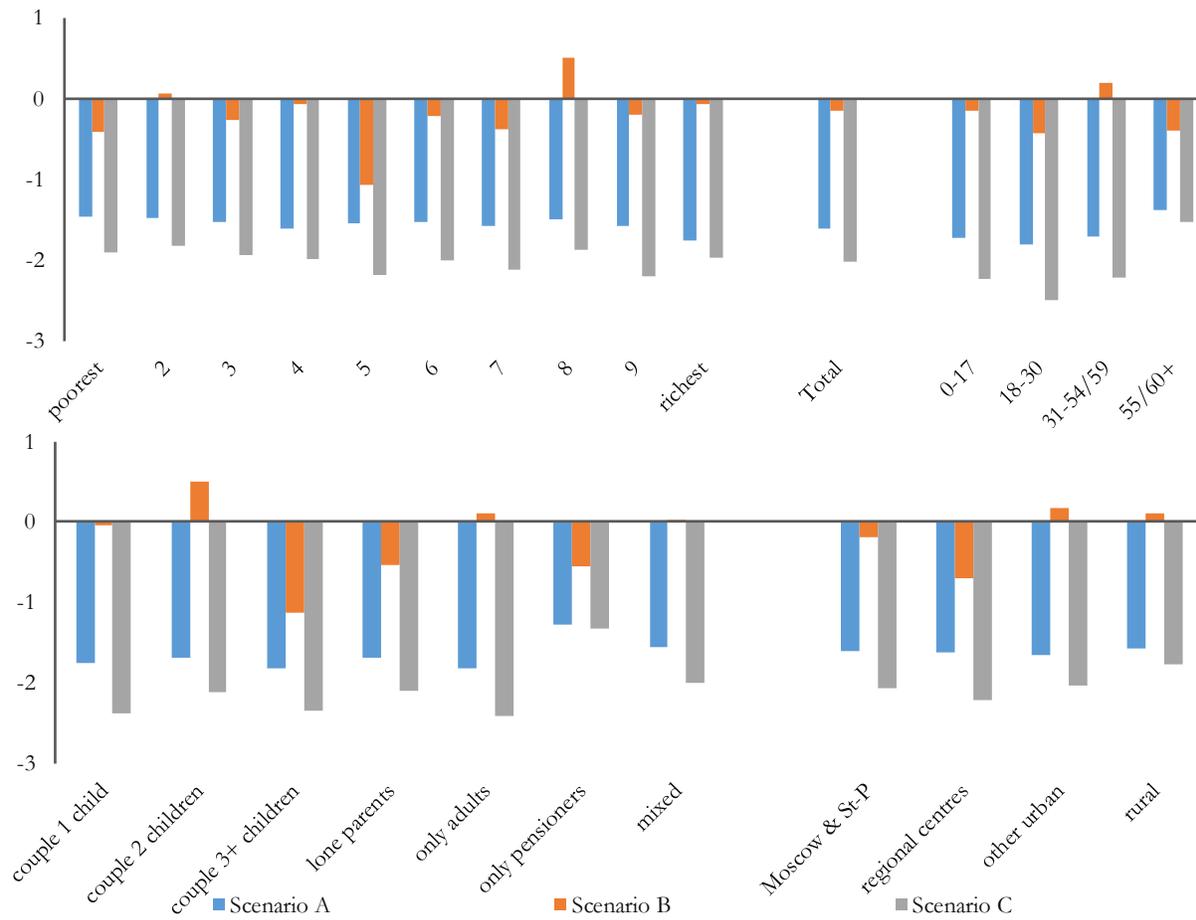
**Figure 9: Reform-2: Tax maneuver, nobody formalizes. Percentage change in consumable income w.r.t. no-reform scenario by decile, age group, household and location types.**



Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

Tax maneuver in combination with formalization would have a negative welfare impact for most income and socio-demographic groups. Figure 10 shows the distributional outcomes of reform 2 with the assumption that 50 percent of informal workers move to formal sector, by the population subgroups. In this case the welfare gains obtained through the reduction of SIC accruing to employees (in scenario B) are compensated by the higher SIC taxes paid on the previously untaxed informal incomes. Yet in scenarios A and C the negative effect will be lower for the bottom deciles than for the rest of population. This is because households in the bottom of the distribution rely less on labor income.

**Figure 10: Reform-2: Tax maneuver and formalization of 50 percent of informal employees.**  
**Percentage change in consumable income w.r.t. no-reform scenario by decile, age group, household and location types.**



Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

### Effects of the tax maneuver on employment, income distribution and fiscal budget based on a probabilistic model

Another mechanism of selecting individuals that undergo formalization is approximating the behavioral decision to formalize as a response to tax changes through a probabilistic model. To relax the assumption of random selection of those who formalize used in the previous section, a logistic model was used to estimate the probabilities of being formally/informally employed based on changes in wages (before and after-tax changes) and personal characteristics.<sup>21</sup> These estimates render a more precise picture of the possible effect of the tax maneuver than the previous exercise for two reasons. First, they give an estimate of the share of individuals who would formalize due to the tax reform, and second, they indicate which individuals -according to personal characteristics- are more likely to formalize. These data are then used as input for RUSMOD to calculate the effect of formalization on

<sup>21</sup> The authors also tried simulating the transitions between non-employment and formal employment, but that lack of information in the survey regarding the reasons for not working and no information to simulate those changes did not allow doing so.

the welfare and fiscal indicators. Since the behavioral model assumes that reduction of SIC is translated to increase net wages, this implies that economic incidence of SIC falls on workers. This is close to assumptions used in scenario B and for that reason the results of behavioral simulations below are compared only to the random formalization analysis under scenario B.<sup>22</sup>

The transitions of individuals from informal to formal employment were simulated using the behavioral model. For this purpose, informality was defined as being informally employed at the main or the second job only.<sup>23</sup> The probabilities of being formal and informal were estimated using a logistic regression of the informality status on the logarithm of net wages and various socio-demographic controls. We estimated the models separately for men and women. The common predictors for both genders included age and age squared, marriage and family status, level of education and sector of employment as well as household size and type of locality (urban/rural). The model for women additionally included two variables – the number of dependent children and pensioners in the household – to control for time-use allocations that are more common among women and affect their labor market participation. The sample was restricted to all employees aged 16-72 years and to those who reported all the necessary parameters. The estimates from the model are presented in Table A-12. The model predicts the current informal status quite well. First, the model was used to predict the current informality status (before the change in SIC and increase in VAT). Using the natural threshold of 50 percent (if the predicted probability of being informal is higher than this number the person is assigned the status of being informally employed) the predicted share of informal workers (20.2 percent) is lower than the original share (25.8 percent), while the match is quite good – for 78.9 percent of workers the predicted status is consistent with the actual one. The status was not predicted correctly for 21.1 percent of workers (see Table A-13).

According to the model, the reduction in SIC has very small impact on formalization. The same model was used to predict the informality status after the reduction in SIC. This was done by calculating the predicted probability of being informal using the same demographic variables and the post-reform net wages (assuming that an 8 p.p. reduction in SIC translates into an equal increase in take-home pay of the informal workers). According to the model, only less than 1 percent of informally employed employees have incentives to switch to formal status due to the reduction in SIC rate. This result is based on fitted probabilities of being informal conditional on observed characteristics, after an increase in take-home pay due to the reduction in SIC.<sup>24</sup> Alternatively, we can include a random factor (representing either unobserved characteristics or limited optimization) to forecast formal/informal status after changes in SIC. In this case the share of informal workers who are predicted to become formal increases to 6.2 percent.

These results indicate that the reduction in SIC rates is likely to have small impact on formalization, and hence limited effect upon fiscal balance and income distribution (Table 7). The welfare effect of the behavioral model when less than 1 percent of informal workers formalize is almost identical to the results of a static simulation of the tax maneuver assuming that nobody formalizes. Poverty rates decreases by 0.2 p.p. The welfare effect from the behavioral model when 6.2 percent of informal workers formalize is in between the static simulation scenarios assuming random formalization of 0 percent and 10 percent of informal workers. Change in poverty rates is similar. These results imply

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<sup>22</sup> Scenarios A and C assume no tax incidence of SIC on employees and, hence no behavioral response should be expected from them to an SIC rate reduction.

<sup>23</sup> This slightly differs from the random allocation model which also includes the possibility of being informal at occasional jobs (see Annex 4. Additional result of informality-related simulations. for more details).

<sup>24</sup> We assume changes in VAT have not impact on formal employment.

that the results are not very sensitive to the procedure of selection of workers who formalize (randomly selected individuals in our static scenarios and individuals with the highest probability of informal employment according to the behavioral models). Therefore, the behavioral model confirms the robustness of the results of static simulations.

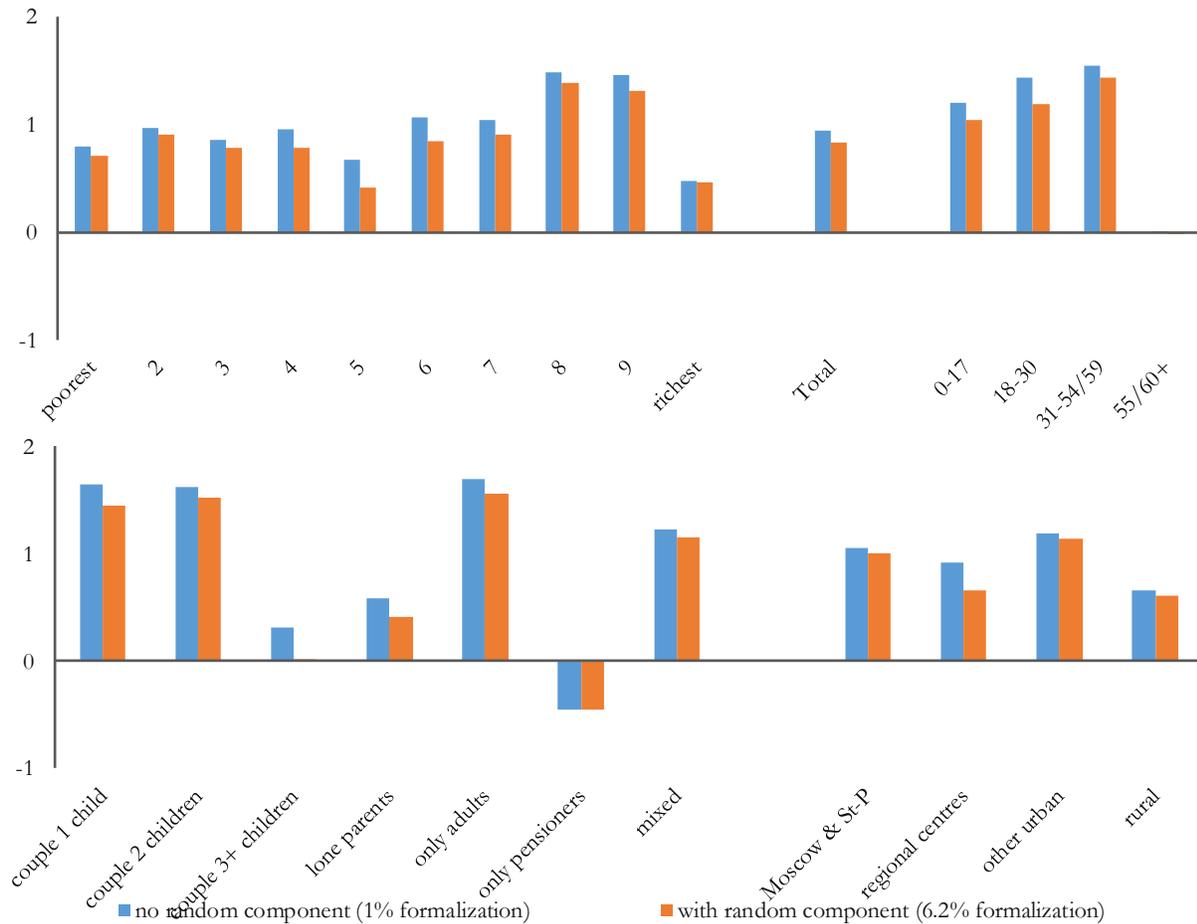
**Table 7: Simulated changes in indicators of income distribution and fiscal budget, behavioral simulation**

	no random component (1% formalization)	with random component (6.2% formalization)
Income of 1st decile, %	0.8	0.7
Income of the formalized, %		-11.7
Income total, %	0.9	0.8
Absolute poverty rate of the formalized, p.p.	0.0	9.3
Absolute poverty rate, p.p.	-0.2	-0.1
Gini index, p.p.	0.0	0.0
Total budget balance, % of GDP	-0.6	-0.5

Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

If the economic incidence of SIC falls on workers, all deciles and age groups benefit from the tax maneuver and the formalization that it drives. As shown in Figure 11, on average, per capita household consumable income increases by 0.8 percent. The highest gain goes to the 8th and 9th decile – they get an additional 1.3-1.4 percent of consumable income, while the lowest effect is observed in the middle of the income distribution (0.4 percent for the 5th decile) and at the top (0.5 percent for the 10th decile). The reform has the highest positive welfare impact for families with working age adults and with 1-2 children. Families with 3 or more children and lone parents have the smallest positive effect, while pensioner households are the only group that is losing because they suffer from VAT increase and do not benefit from SIC reduction. Those who were formal before the reform gain more than other groups of workers. Their per capita consumable income increases by 2.2 percent. At the same time, for those who formalize the net loss amounts to 11.7 percent of their consumable income. The effect for those who are not working (pensioners) is almost neutral.

**Figure 11: Tax maneuver and formalization based on behavioral simulations (with and without random component). Relative change in consumable income w.r.t. no-reform scenario by decile, age group, household and location types.**



Source: Authors' calculations using RUSMOD for 2017 policy year and 2016 RLMS-HSE data.

## V. Conclusion

Microsimulation models such as RUSMOD are very versatile tools with multiple potential applications. Such models can be used, for example, to: (i) analyze existing policies in terms of who is gaining from the system, and who is a net payer; (ii) analyze policy reform proposals in terms of how they may affect various population groups (for example, to ensure that low-income households are protected), and what are their consequences for poverty, inequality or budgetary outcomes; (iii) calibrate policy packages to meet specific criteria, such as revenue-neutrality; (iv) provide a counterfactual for comparisons, where only policies are changed, not the economic circumstances, or vice versa; (v) “nowcast” the income distribution, where changes to the income distribution due to policies can be estimated in real time via simulations, rather than on the actual data that takes time to arrive; (vi) compare actual vs statutory performance of various programs (for example, to estimate tax avoidance); and (vii) “switch on” or “switch off” single policies to isolate and understand their impact, or “borrow” selected policies from other countries where they are known to perform well.

We perform some of these policy experiments using RUSMOD and find that the Russian tax-benefit system reduces poverty by half and inequality by a third if direct and indirect taxes and cash transfers are taken into account. There are however two caveats to this statement. First, this performance, while commendable, is moderate for international standards. In particular, the system of direct taxes and transfers could be more effective in reducing inequality—in fact, it is the least redistributive among the EU countries. Second, it is not clear that this performance is being achieved in the most efficient or effective way. Almost the entire equalization in Russia happens through pensions, and—unlike in many other countries—the role of direct taxes and direct benefit, particularly means-tested benefits, is minor. We also find that fiscal policy changes between 2010 and 2017 benefited mostly the middle of the income distribution. Despite large sums spent on social protection, the system did not prevent people from falling into poverty during the 2014-16 recession.

This paper also assessed the role of changes in the tax-benefit system in explaining the incidence of informal employment in Russia. In particular, we investigate whether the existing system creates disincentives for formalization in terms of reducing household income, increasing poverty and inequality; and whether the hypothetical ‘tax maneuver 22/22’ could help reduce the opportunity costs of formalization for informal workers, improve distributional outcomes and increase fiscal revenues. We simulate a number of hypothetical scenarios assuming random formalization of some (or all) informal workers, the tax maneuver without formalization and the tax maneuver followed by formalization. In addition, we also attempt to simulate behavioral responses to the tax maneuver through a probabilistic model.

The main conclusion from that analysis is that formalization without any changes in tax policy would result in significant gains for the budget but would have negative impact on the current income of the population in general and on current incomes of the target group. Assuming zero changes in informality, we find that the tax maneuver will result in additional budget deficit of up to 1 percent of the GDP but will be beneficial for the population under the assumption that economic incidence of all taxes falls on workers. The fiscal losses due to the tax maneuver could be fully compensated if at least 50 percent of workers would formalize. But then workers who formalize would see a fall in current incomes and poverty rates for them and the society in general would increase; the tax maneuver is not able to compensate for the losses in the population income under any scenario. The results of behavioral model show that the share of the formalized is not very sensitive to changes in net wages due to the tax maneuver: at most 6 percent of informal workers would become formal, leading to small increase in poverty and a decline in fiscal revenues.

From a policy perspective our research implies that informality in Russia is a more complex phenomenon and could hardly be addressed by a single intervention, such as the shift from direct to consumption taxes. However, there are certain conclusions that could be done based on this analysis as well as another paper in this project. The evidence compiled by this research points to three main messages.

First, the tax reforms such as a reduction of SIC or other direct taxes could have very limited effect in terms of reducing informality in Russia. According to our model, the 8-percentage point reduction in SIC rates seems to elicit a too small formalization. A larger SIC reduction could do better but, given its fiscal cost if generalized to all income groups, perhaps it should be focused on a few selected types of workers (e.g. the youth, rural workers, self-employed). Moreover, incentives upon firms, which we do not include in our analysis, should be better studied and considered as part of formalization policy.

Second, given the fiscal cost of large tax reductions and the need to both sustain the public health/pension system, more supervision/enforcement of tax/contribution payments should be considered as part of formalization campaigns. Our analysis only includes short term impact of formalization upon current net wages, VAT and some social security benefits; but it can be argued that long term benefits -particularly in terms of pensions- should also play a role in the worker's decision to formalize. However, workers may suffer from myopic behavior (unable to gauge the long-term impact of not contributing to social security) or moral hazard (freeride on other people's contributions to enjoy some social security benefits now without contributing). In both cases, information and enforcement policies, rather than changes in rates, are warranted.

The evidence from this paper is strictly short-term, partial equilibrium and thus calls for areas of further research. Models of the formal-informal dynamics among self-employed and firms are also needed to have a more complete understanding of how a tax-maneuver may affect formal employment among these groups in Russia. Likewise, a general equilibrium analysis of wage and labor productivity changes after a tax maneuver is also needed to know if there would be net wage gains to formalization, not only due to changes in tax and transfers, but due to productivity gains. Finally, an analysis of life-cycle welfare, including access to pensions, would be needed to understand formalization decisions based on a long-term cost-benefit assessment from workers.

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## VII. Annexes

### Annex 1. Basic facts about the Russian tax-benefit system

The tax system in Russia is largely a unified, national system. It consists of social insurance contributions (SIC), personal income tax (PIT), value added tax (VAT), tax on mineral resource extraction, corporate profit tax and the excise tax.<sup>25</sup> Social insurance contributions are payroll taxes paid by employers on behalf of employees. All SIC payments are linked to individuals when calculating their pensions, sickness or maternity allowances. The personal income tax system is an individual system. There are some income sources on which the tax is withheld at payment (notably, wages) and the final tax liability is computed on the basis of a tax declaration after the tax year has ended (net of amounts already withheld). Pensions and social benefits are not taxable. Tax allowances are available to those taxpayers who had deductible expenditures in the previous year—they are deducted from taxpayer’s withholding income tax base each month until the cumulative annual income reaches a certain threshold.

Social protection in Russia is funded from several levels of the government. The Consolidated Budget (at the federal, regional and municipal levels) accounts for over half of total social protection spending, with extra-budgetary funds (including the Pension Fund, Social Insurance Fund, and Federal and Territorial Funds of Mandatory Health Insurance) accounting for the rest. The revenues of the Consolidated Budget are derived from general taxes (federal, regional and local), while that of extra-budgetary funds derive partly from social insurance contributions (paid by employers and the self-employed), and partly from transfers from the federal budget. With a bulk of the budgetary expenditures on social protection administered at the sub-national level (see below), intergovernmental fiscal transfers grew to account for about one-third of the federal budget.<sup>26</sup>

The 2005 decentralization reform redesigned social protection responsibilities between the national and sub-national levels. Pensions and social insurance allowances are regulated and financed at the federal level, while the majority of non-insurance-based benefits and social services has become the mandate of the regions.<sup>27</sup> Regional authorities set the size and eligibility criteria within the limits established by the federal legislation, and a few municipalities provide their own local social assistance benefits. Virtually all regional social protection programs are administered at the municipal level, typically through municipal departments of social protection, which consist of the Payment Offices (responsible for delivery of cash allowances), and the Service Centers (responsible for provision of home-based social care for children, the elderly and the disabled). All federal payments (such as pensions or maternity capital) are delivered by the local offices of the Pension Fund.

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<sup>25</sup> There are a few taxes set by regional and local governments (such as corporate property tax, land tax, vehicle tax or gambling tax), but their share in the overall intake is small.

<sup>26</sup> The system of intergovernmental allocations is very complex and results in high administrative costs. The lack of transparency and misaligned incentives leave the system open to lobbying by regions to obtain better “treatment” from the center (World Bank 2011).

<sup>27</sup> The federal budget also covers expenditures on people who do not qualify for social insurance (such as childcare allowance up to 1.5 years for non-working women or social pension), as well as the budget deficit of the Pension Fund. The expenditures on uninsured people using public health care are covered by the Regional Budgets.

The statutory pension age is 55 years for women and 60 years for men.<sup>28</sup> Both early retirement and postponement is possible. Also, various occupational pensions exist. It is possible to receive pension benefits while still working—indeed, about one-third of pensioners are employed.

The benefit system has many child- and family-related features. For benefit purposes, dependent children are typically defined as those under 16 years of age (or under 18 if they are enrolled in daytime education).<sup>29,30</sup> For tax deductions, dependent children are those under 18 years of age (under 24 if enrolled in daytime education). For benefit purposes, single parents are the parents of dependent children whose birth registration certificate does not have an entry concerning the father, or an entry has been made on the basis of a statement by the mother, or whose parent has been avoiding paying alimonies. A household consists of all persons living together and sharing their incomes and expenditures.

Some benefits are means tested. The income test is usually carried out by comparing the income of an applicant with the national poverty line. This so-called Subsistence Minimum Level (SML) is determined by the cost of the minimum basket of goods and services. The composition of the basket is calculated for three demographic groups (children under 16 years old, people of active working age, and retirees) and is estimated quarterly for each region. Eligibility for child allowance is assessed according to monthly income of the parents averaged over the preceding 3 months. Eligibility for means-tested state social assistance and housing subsidies is assessed using monthly household income averaged for the preceding 3 and 6 months, respectively.

Minimum wage is a parameter in certain benefits. It is applied for the regulation of wages, unemployment benefits and insurance-based allowances due to temporary incapacity and maternity. The minimum wage is updated on an ad-hoc basis in connection with inflation. According to the Labor Code, the minimum wage cannot be lower than the poverty line for a working age person.<sup>31,32</sup>

Changes to tax and benefits typically happen at the beginning of the fiscal year. The fiscal year runs from January 1 to December 31. The tax system generally changes on January 1st each year, and key benefit changes also happen at the same time, however they may be implemented at other times of year.<sup>33</sup> Social benefits and pensions are usually assessed and delivered on a monthly basis and amounts are referred to in monthly terms. Tax breaks and most cash allowances often change in an ad-hoc manner. Labor (contributory) pensions are indexed to inflation and the growth rate of average wages. Social (non-contributory) pensions are indexed to the cost of a pensioner's poverty line. For benefits which are financed from the federal budget (such as unified cash payment) amounts are indexed annually by a coefficient defined in the Federal Budget Law. This coefficient typically adjusts

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<sup>28</sup> The pension reform that took force in 2019 implies a gradual increase in the retirement age to 65 years for men and 60 years for women by 2028.

<sup>29</sup> There are some exceptions to this rule, such as for children with disabilities.

<sup>30</sup> Education is compulsory from 7 years of age, until the child acquires basic secondary education (typically 9 years).

<sup>31</sup> However, this norm is currently in breach. In recent years, the minimum wage was equivalent to 60-70 percent of the poverty line of a working age person.

<sup>32</sup> Finally, in some areas of the North and Far East of Russia a special coefficient is applied to adjust wages for the cost of living in extreme climate conditions. The sizes of state pensions and some other cash allowances may be adjusted by this coefficient.

<sup>33</sup> For example, indexation of pensions can be held on a quarterly basis if the inflation rate is 6 percent or higher.

the amounts for inflation.<sup>34</sup> The amounts of benefits financed from the Regional Budgets are indexed according to the regional laws which vary a lot.

**Table A-1. Programs simulated in RUSMOD, 2017**

<b>Employer social insurance contributions</b>
Computed only for formal sector workers. Social insurance contributions (SIC) are paid by employers on behalf of employees to cover the costs of mandatory social insurance-based allowances, public pensions and health care. Contributions rates are set by federal laws. Social contributions apply to the withholding personal income tax base (namely, gross earnings). For <u>pension</u> contributions the annual employment income below 876,000 rubles is taxed at 22% rate, while income above this amount is taxed at 10%. <sup>35</sup> The rate of <u>social insurance</u> contributions is 2.9% and the amount exceeding 755,000 rubles is exempt. The rate for <u>health care contributions</u> is 5.1%, and there is no upper limit for annual income.
<b>Self-employed social insurance contributions</b>
Computed only for formal sector workers. The size of contributions for the self-employed is determined as the minimum wage times the SIC rate. The minimum wage is 7,500 rubles per month. The self-employed are obliged to pay only pension and health insurance contributions, participation in other social insurance programs is voluntary. The rate of pension contributions is 26%. The amount exceeding 300,000 rubles is taxed at 1% rate. The total contributions should not exceed 8 times the minimum wage multiplied by the 26% rate. The rate for health care contributions is 5.1%.
<b>Personal Income Tax</b>
Computed only for formal sector workers. A unified tax rate of 13% applies to main income (work for pay, contractor's agreements, housing lease). Public pensions and allowances are not taxable. Capital gains from asset sales are taxable only if the seller owned the asset for less than three years. A higher tax rate of 35% applies to some sources of income, such as bank interests that exceed some interest rate limit (which is typically non-binding). Dividends are subject to a 9% tax. The model differentiates between withholding income tax and final income tax. The former is the amount withheld by the employer as partial payment of employee's income tax. For the latter the liability is based on the final tax report submitted at the end of each tax year (in April). There are non-refundable standard tax allowances that are used to reduce the withholding income tax base and there are non-refundable social tax allowances that reduce the final income tax base (the latter are related to expenses on charity, education and health care). The tax liability for the self-employed is simulated in the same way.
<b>Lump-sum benefit for childbirth/placement of a child into family</b>
A federal lump-sum allowance of 16,350 rubles paid to families for each newborn or adopted child. Some regions set additional payments on top of that.
<b>Maternity leave allowance</b>
The allowance is paid only to socially insured women for the period of 140 days (70 days preceding the childbirth and 70 days after; or for 194 days in case of two or more children). Women are eligible if their contribution record is no less than 6 months. The amount is 100% of average monthly earnings net of withholding income tax, subject to an annual upper limit established annually by the Social Insurance Fund (248,164 rubles/343,884 rubles in case of two or more children). The average monthly earnings are calculated taking into account earnings over the two years preceding the maternity leave.
<b>Allowance for women who have registered in health care institutions by the 12th week of pregnancy</b>
A lump-sum allowance equal to 613.4 rubles.
<b>Childcare allowance up to 1.5 years</b>
There are two types of this allowance. Contributory allowance is available to socially insured mothers (employed for at least 6 months) and is proportional to mother's average net earnings over the past two years preceding the childcare leave. The monthly amount equals 40% of net earnings with an upper limit of 23,120 rubles. The minimum amounts are 3,066 rubles for the first child and 6,131 rubles for the second and subsequent children. Non-contributory allowance is provided to women without a contribution record. The monthly amount equals to the minimum amounts shown above. A mother may remain on childcare leave up to three years, however, after 1.5 years they are only eligible for a monthly compensation of 50 rubles (this amount might be topped up from the regional budget, but few regions do so).
<b>Maternity capital</b>
This is a lump-sum payment (453,026 rubles) granted to each woman who gave birth or adopted the second (third and consequent) child. Each mother is entitled irrespectively of the date of a birth of the first child, but only once. Mothers are

<sup>34</sup> However, in 2013-14 the coefficient was higher than inflation, while in 2015-16, due to fiscal consolidation, the amounts were "frozen" for the majority of benefits.

<sup>35</sup> The average ruble exchange rate was 60.9 rubles per U.S. dollar in 2015 (RLMS survey year), and 58.7 rubles per U.S. dollar in 2017Q1 (RUSMOD calibration). The 2011 PPP conversion factor is 23.4.

allowed to dispose of the capital only in certain ways, of which the most popular one is the improvement of housing conditions (via a purchase, construction, or overhaul of housing). The capital may be used in parts. The right to dispose of the maternity capital comes into effect when the child reaches the age of three or upon expiration of three years following the adoption. However, these limitations were partly eased several times during the crisis periods (in 2009-10, in 2015-16) when families were allowed to withdraw a part of the capital in cash. We simulate the amount for all mothers who have at least two children and the second child is aged three years old.

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#### **Compensation of charges for pre-school institutions**

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Cash compensation is provided to all families with children attending pre-school institutions. The size of compensation is proportional to the actual fees paid by parents and amounts to 20% for the first child, 50% for the second child and 70% for all subsequent children. If fees are higher than the average fees in the region, the latter are used as a base.

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#### **Child allowance up to 16(18) years for poor families**

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A monthly means-tested allowance is paid to families with children below 16 years (or 18 years if they are in full-time education). The means-test is applied to the sum of parents' net earnings, scholarships, pensions and alimonies averaged over the last three months. The amount is set by regional authorities and varies considerably across regions. Typically, there is a basic amount for children from two-parent families and an increased amount (two times the basic amount) for children of single mothers. In some regions the amounts are differentiated depending on the age of the child and number of children in the family. This benefit is simulated with assumptions of some non-take up.

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#### **Allowance for the third child up to three years of age for poor families**

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A monthly allowance, co-financed from the federal budget, for the third or subsequent children up to three years of age. The allowance is paid in regions where the fertility rate is lower than for Russia as a whole. The amount of the allowance is equal to a regional Minimum Subsistence Level (SML) for a child. The allowance is targeted to families whose monthly per-capita income is below the average income in the region (or below the regional SML in a few regions).

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#### **State social assistance**

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The allowance is means-tested and targeted to poor households and households in difficult life situation. This program is at full discretion of regional authorities. It can be provided in different forms: cash or in-kind, as a lump sum or a monthly allowance. As per federal guidelines the means-test is applied to total household income from all sources averaged over the three preceding months. The most common eligibility rule is that the total household income should be below the (fraction) of the regional poverty line, for reasons that could not be prevented by the family. This for example means that all people of working age should provide a justification as to why they are not in work. The target group may be additionally narrowed to certain population categories at the discretion of regional authorities (for example, single mothers or pensioners living alone). The amount of the monthly allowance usually equals a (fraction) of poverty gap for a given household. It is not uncommon to define upper and lower limits depending on capacities of the regional budgets. The regional authorities might impose additional eligible conditions. This is regulated by the Social Contract between the local social protection office and the applicant. This benefit is simulated with assumptions about the amount and non-take up.

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#### **Housing subsidy**

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This is a means-tested benefit designed to assist low-income households with meeting the costs of rent and utilities. The means-test is applied to the total household income from all sources (including all social assistance allowances). The amount computation formula is quite complex, namely:

$$\text{Housing subsidy} = (\text{social standard of living space} * N \text{ of persons in the household} * \text{social standard of the cost of rent and utilities per } 1\text{m}^2) - (\text{household income} * \text{maximum share of rent and utilities in household income}).$$

For poor households, that is, those whose income is below the regional SML, and for households eligible for discounts on rent/utilities, the amount is additionally adjusted upwards and downwards, respectively. The subsidy is only available if the household has no debts for rent/utilities. The size of subsidy cannot exceed the actual cost of rent and utilities incurred by the household. Social standards of the cost of rent/utilities and its maximum share in household income (no more than 22%) are set by regional authorities. This benefit is simulated with assumptions about non-take up.

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#### **Value added tax**

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The standard rate of VAT is 18%. A number of transactions are exempt, including export and international transportation services. Certain items under certain conditions are also exempt from VAT, such as sale of certain medical goods and services, educational services rendered by nonprofit educational institutions, services rendered by culture and art organizations or banking and insurance services. A reduced 10% rate is applied for certain foodstuffs, certain goods for children, printed periodicals and certain medical goods. We simulate VAT based on household expenditures.

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#### **Excise tax**

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Excise taxes are imposed on the sale of excisable goods and on the import of such goods. The excisable goods are: raw and refined alcohol, alcoholic drinks stronger than 0.5% by volume, tobacco products, petrol and diesel fuel, motor oils, passenger cars and motorcycles with engines in excess of 90 hp. and fuel for home heating. In contrast to VAT, excise duties are typically expressed as a fixed amount per quantity. Cigarettes are additionally taxed based on the percentage of

manufacturers' suggested retail price. The model simulates excise taxes based on information about the quantities of excisable goods consumed by households (if quantities are not reported, they are recovered from expenditures with assumptions about the average unit value; for example, price for 1 liter of petrol).

Notes:

(1) Typically, the eligibility for social allowances is defined using incomes reported for the 3, 6 or 12 months preceding the date of application. However, in the survey data, the reference period is 1 month preceding the survey. In simulations we assume that the amount of income reported is received at the same rate throughout the year.

(2) There are also rules in the policy spine not shown above because they do not define programs. Rather, they define objects, such as tax units, income lists, unreported incomes, subsistence minimum level, etc., that are used by the actual tax/benefit rules.

**Table A-2. RUSMOD input database, 2017**

RUSMOD database	RF 2016 a1
Original name	Russian Longitudinal Monitoring Survey (RLMS-HSE)
Provider	National Research University - Higher School of Economics
Year of collection	2016
Period of collection	October-December 2016
Income reference period	Typically income and expenditure for the month preceding the survey, for some types of expenditures - 3 months preceding the survey
Sampling	A three-stage stratified clustered probability sample of dwellings
Unit of assessment	Individual and household (people living together and sharing income and expenditures)
Coverage	Permanent residents, people living in institutions are excluded
Response rate for household grid	80% (60% in Moscow and St-Petersburg)
Final sample used in the model	
Individuals	12,554
Households	4,849
Population with grossing-up weight*	
Individuals	143,454,148
households**	61,168,334
Population according to Census	
Individuals	146,804,000
households**	61,168,333

Notes:

\* Weights are used in order to adjust the results for sample design and non-response, as well as for deviations from the census. In addition, weights provided with the original data were scaled up to the total population.

\*\* Estimated by dividing the population by the average household size.

Source: RUSMOD for 2017 policy year and 2016 RLMS-HSE data

**Table A-3. RUSMOD uprating factors, 2017**

	2016	2017	
Consumer Price Index, December to December (2007=100%)	213.9	219.2	Source: <a href="http://www.gks.ru/free_doc/new_site/prices/potr/tab-potr1.htm">http://www.gks.ru/free_doc/new_site/prices/potr/tab-potr1.htm</a> .
Federal Subsistence Minimum Level (IV Q), rubles	9691	9786	Source: <a href="https://fedstat.ru/indicator/30957">https://fedstat.ru/indicator/30957</a> .
Accrued average monthly nominal wages per employee (IV Q), rubles	47554	51197	Source: Short-term indicators digest by Rosstat.
Average awarded pension (IV Q), rubles	12428.6	12949.5	Source: Short-term indicators digest by Rosstat.
Average per capita money income (IV Q), rubles	45938.2	48674.9	Source: Short-term indicators digest by Rosstat.
Average per capita consumption expenditures (IV Q), rubles	17735.8	17908	Source: Income, expenditures and consumption (HBS data).
Average per capita expenditures on housing and utilities (IV Q), rubles	2087	1896.2	Source: Income, expenditures and consumption (HBS data).
Expenditures on social benefits and assistance, mln rubles	2552247	2552247	Source: Russian Statistical Annual Digest 2017.
Expenditures on unemployment benefits and material aid to the unemployed, mln rubles	37590	37590	Source: Russian Statistical Annual Digest 2017.
Expenditures on childcare allowances up to 1.5 years, mln rubles	157361	157361	Source: Russian Statistical Annual Digest 2017.
Expenditures on child benefits up to 16(18) years, mln rubles	51709	51709	Source: Russian Statistical Annual Digest 2017.
Expenditures on cash payments to some categories of citizens, mln rubles	931251	931251	Source: Russian Statistical Annual Digest 2017.
Expenditures on housing subsidies and privileges, mln rubles	359001	359001	Source: Russian Statistical Annual Digest 2017.
Expenditures on scholarships, mln rubles	82400	82400	Source: Russian Statistical Annual Digest 2017.

Source: RUSMOD for 2017 policy year and 2016 RLMS-HSE data

## Annex 2. Main assumptions and model validation

Validating simulation output against official statistics is a necessary step in assessing the robustness of a microsimulation model. To ensure comparability with external sources, such as national accounts or administrative data, some assumptions were used in the model. Three main assumptions/adjustments are discussed below. In general, although our modeling reflects as close as possible the existing statutory rules, in the baseline scenario we tried computing economic rather than statutory incidence of taxes and benefits.

First, RUSMOD excludes informal sector workers from simulations of PIT and SIC. The RLMS attempts to capture informal sector jobs, which appear to be quite widespread, especially for additional jobs. According to RLMS data, as of 2016, the share of informally employed amounted to 19.8 percent at the main job and 44.2 percent at the second job, among employees. Among the self-employed, 63 percent were classified as informal workers at the main job.<sup>36</sup> Among those who reported occasional self-employment, 89 percent were informal. To account for this, in simulations of SIC, PIT and earnings-related benefits the earnings of informal sector workers were set to zero.

Second, we impute unreported income. A large share of earnings and other types of income might remain unaccounted for by the survey due to non-response or underreporting. In this respect, the availability of information about both household income and consumption is one of the big advantages of the RLMS data. Assuming that expenditures are a more reliable and less volatile welfare indicator than income, we have imputed *unreported income*.<sup>37</sup> To arrive at this estimate, households' disposable income reported in the survey (before any simulations are done) was

<sup>36</sup> A similar question for the self-employed at a second job was not included in the questionnaire. Hence, they were classified as informal.

<sup>37</sup> This is done in a separate policy rule, which is switched on by default, but can be switched off by the user if necessary.

subtracted from the sum of household consumption expenditures. If the result was positive it was treated as untaxed unreported income.<sup>38</sup> For almost a third of the sample the unreported income was above zero. The share of unreported income in the simulated disposable income ranged from less than 10 percent in the bottom decile to almost 30 percent in the top deciles. This fits well with the a-priori assumptions about the distribution of non-response. Unreported income was then included in the means test for two allowances<sup>39</sup>: the *state social assistance* and the *housing subsidy*, as proxy for unobserved household assets.<sup>40</sup>

Third, we assign non-take up probabilities for the three (partially) means-tested benefits and for maternity capital. The share of households eligible for means-tested allowances in the survey data is higher than administrative records suggest. Unfortunately, Rosstat and other external sources do not collect any information about non-take up of benefits, therefore we had to apply a random non-take up correction, per EUROMOD guidelines.<sup>41</sup> The take up probabilities were estimated as the ratio between the caseload recipients reported in administrative statistics and those simulated to be eligible by RUSMOD. Those probabilities (41.3 percent for child allowances up to 16 (18) years, 26.9 percent for state social assistance, 29.8 percent for housing subsidies and 94.3 percent for maternity capital, respectively) were applied at the benefit unit level.<sup>42</sup> This method is rather rough and does not fully reflect the actual take-up issues at play (discretionary power of local social protection offices, detailed assets test), but in the absence of any take-up adjustment, the numbers of recipients of benefits would be inflated leading to an underestimation of poverty.

The remainder of this section compares RUSMOD aggregates with that from official statistics for 2017. For example, the number of employed people in the data appears to be underestimated by 18 percent compared with Rosstat (Table A-4), while the number of pensioners is overestimated by 19 percent and the number of the unemployment benefit recipients by almost 67 percent (Table A-4). This could be due to the sample bias typical for all longitudinal surveys such as RLMS-HSE. At the same time, the number of the unemployed by ILO definition is under-predicted by 9 percent.

**Table A-4. Number of employed and unemployed (in thousands), 2017**

	EUROMOD	External	Ratio
number of employed	59,282	72,324	0.82
number of unemployed (ILO)	3,867	4,264	0.91

Source: Rosstat and RUSMOD for 2017 policy year and 2016 RLMS-HSE data

Results for numbers of benefit recipients and taxpayers are presented in the tables below. Receipt of the *monthly cash payment* and *categorical benefits for housing/utilities* is underreported by about 50 percent (Table A-5). For the former, the reason might be that the payment is provided from the

<sup>38</sup> This is, of course, a very rough treatment that disregards factors such as household saving behavior, life-cycle effects and other reasons why reported income may be lower than reported consumption. Nevertheless, the imputation needs to be done for income figures to be comparable with the official statistics. Furthermore, similar adjustments are done regularly for macro-statistics.

<sup>39</sup> The means test for child allowances does not account for the household income. Only earnings or replacement incomes (pensions, maternity allowances, etc.) of parents have to be reported.

<sup>40</sup> Given that information on assets reported in the survey is limited, compared with that available to local social protection offices, and given the positive correlation between household assets and unreported income, the inclusion of the latter enables us to simulate the means test more precisely.

<sup>41</sup> Non-take up here means that some of those who qualify for a benefit do not receive it for any reason. Non-take up rate is defined as the ratio between those who are eligible, but not receiving the benefit, and all those who are eligible.

<sup>42</sup> Take-up probabilities are defined in each relevant policy rule at the end of the simulation. A user can change these probabilities or switch off the take-up correction for each benefit separately by modifying the relevant parameters in each policy rule.

Pension Fund along with pension, hence people have difficulty in recalling it. The latter are difficult to detect because the discounts are included in the payment due on utility bills. Regarding birth grants and childcare allowances up to 1.5 years, the number of recipients seems to be under-simulated by 50–60 percent, which may be due to underrepresentation in the sample of families with young children. Families with 3 children are few in general, and they seem to be underrepresented as well. For the means-tested benefits, a good match is achieved by calibrating the take-up rates with administrative data. The receipt of maternity capital matches the external number quite well.

**Table A-5. Programs included but not simulated in RUSMOD, number of recipients/payers (in thousands), 2017**

	RUSMOD	External	Ratio
<b>Benefits</b>			
Public pensions	53,826	45,182	1.19
Unemployment benefit	1,413	848	1.67
Scholarships	2,329		
Monthly cash payment	11,279	26,154	0.43
Categorical benefits for housing/utilities	17,536	36,688	0.48
<b>Taxes and Social Insurance contributions</b>			
Property and vehicle taxes	5,914		
Social allowance on personal income tax	868		

Source: Rosstat and RUSMOD for 2017 policy year and 2016 RLMS-HSE data

**Table A-6. Programs simulated in RUSMOD, number of recipients/payers (in thousands), 2017**

	RUSMOD	RLMS-HSE	Ratio	External	Ratio
<b>Benefits</b>					
<i>Non means-tested</i>					
Birth grant	877			1,795	0.49
Maternity leave allowance	520				
Lumpsum allowance for pregnant women	520			552	0.94
Child allowance up to 1.5 years*	1,493	1,129	1.32	4,067	0.37
Compensation of childcare costs	2,854				
Maternity capital	776			700	1.11
<i>Means-tested</i>					
Child allowance up to 16(18) years**	4,619	4,368	1.06	4,950	0.93
Allowance for the third child up to 3 years	41			421	0.10
State social assistance	1,762	1,888	0.93	1,732	1.02
Other social assistance***	1,866				
Housing subsidy	2,872	4,552	0.63	3,353	0.86
<b>Taxes and Social Insurance contributions</b>					
Social insurance contributions	45,174				
Personal income tax	46,729				
Value added tax	59,708				
Excise duties	40,952				

Notes:

\* The original RLMS-HSE variable includes all child benefits received up to age of 1.5 years.

\*\* The original RLMS-HSE variable includes all child benefits received by children aged 1.5+ years.

\*\*\* Only monthly cash payment is simulated; the original RLMS-HSE variable includes categorical benefits for transportation, medicines and recreation.

Source: Rosstat and RUSMOD for 2017 policy year and 2016 RLMS-HSE data

Results for tax and benefit amounts are presented in the tables below. Expenditures on pensions are overestimated by 25 percent compared with external data (Table A-7). Expenditures on unemployment benefits are under-predicted by 27 percent, even though the number of recipients is

over-reported in the survey. Spending on categorical benefits for housing and utilities is close to external estimates, while spending on monthly cash payment is underestimated by 65 percent. Programs that appear to match the external data well include maternity capital, child allowances up to 16 (18) years, housing subsidies and state social assistance (Table A-7). Spending on birth grants, childcare allowances up to 1.5 years and childcare compensations are under-simulated by 40-50 percent. Spending on allowances for the third child is underestimated by more than 90 percent. The tax revenues are under-simulated, and almost by the same amount for all taxes (30-35 percent), suggesting that the reason could be related to underrepresentation of employed people (and, hence, earnings) in the survey. Another reason could be that that we are using budgetary projections of social expenditures and tax revenues for 2017, rather than actual numbers.

**Table A-7. Programs included but not simulated in RUSMOD, annual amounts (in million rubles), 2017**

	RUSMOD	External	Ratio
<b>Benefits</b>			
Public pensions	9,283,404	7,397,510	1.25
Unemployment benefit	28,628	39,040	0.73
Scholarships	63,212	82,400	0.77
Monthly cash payment	172,558	495,258	0.35
Categorical benefits for housing/utilities	240,666	243,662	0.99
<b>Taxes and Social Insurance contributions</b>			
Property and vehicle taxes	218,114		
Social allowance on personal income tax	29,982		

Source: Rosstat and RUSMOD for 2017 policy year and 2016 RLMS-HSE data

**Table A-8. Programs simulated in RUSMOD, annual amounts (in million rubles), 2017**

	RUSMOD	RLMS-HSE	Ratio	External	Ratio
<b>Benefits</b>					
<i>Non means-tested</i>					
Birth grant	14,454			30,705	0.47
Maternity leave allowance	47,528			116,685	0.41
Lumpsum allowance for pregnant women	319			552	0.58
Child allowance up to 1.5 years	117,890	95,108	1.24	210,972	0.56
Compensation of childcare costs	10,987			20,253	0.54
Maternity capital	351,726			328,651	1.07
<i>Means-tested</i>					
Child allowance up to 16(18) years	47,866	113,748	0.42	46,447	1.03
Allowance for the third child up to 3 years	4,469			55,026	0.08
State social assistance	18,064	61,932	0.29	18,211	0.99
Other social assistance	61,706				
Housing subsidy	50,733	87,725	0.58	62,757	0.81
<b>Taxes and Social Insurance contributions</b>					
Social insurance contributions	4,426,981			6,304,944	
Personal income tax	2,105,632			3,289,536	
Value added tax	3,631,000			4,842,928	
Excise duties	939,044			1,370,640	

Notes:

\* The original RLMS-HSE variable includes all child benefits received up to age of 1.5 years.

\*\* The original RLMS-HSE variable includes all child benefits received by children aged 1.5+ years.

\*\*\* Only monthly cash payment is simulated; the original RLMS-HSE variable includes categorical benefits for transportation, medicines and recreation.

Source: Rosstat and RUSMOD for 2017 policy year and 2016 RLMS-HSE data

Income distribution estimates are shown in Table A-9. These are computed for individuals according to their per-capita household disposable income. Both average earnings and per-capita household

disposable income in the model are lower by 40 percent than the numbers reported by Rosstat macro-statistics. This should be treated as normal given that the better-off households are more likely to refuse or drop out of the survey. In addition, the income aggregate in macro-statistics is not taken directly from survey data, but is simulated based on the balance of income and expenditures and is therefore adjusted for unreported earnings, which were estimated at 25 percent of total income. As a result, the distribution of income in RUSMOD is more skewed to the left than the Rosstat's distribution. The income share of the two bottom quintiles is overestimated, while the share of the top two is underestimated. This also has an effect on the Gini coefficient and other measures of inequality.

**Table A-9. Distribution of disposable income, 2017**

	RUSMOD	External	Ratio
Mean net earnings, rubles/month	25,695	42,797	0.60
Mean per capita disposable income, rubles/month	22,128	36,616	0.60
Q1	7.6	5.4	1.40
Q2	12.2	10.1	1.21
Q3	16.1	15.1	1.06
Q4	21.3	22.6	0.94
Q5	42.9	46.8	0.92
Gini index, %	34.8	41.0	0.85
Funds ratio, times	9.4	15.3	0.62
National poverty headcount, %	14.7	13.2	1.11

Source: Rosstat and RUSMOD for 2017 policy year and 2016 RLMS-HSE data

### Annex 3. Intertemporal policy effects

Formal framework (Bargain and Callan, 2010):

- $I()$  – a summary indicator (e.g. Gini);
- $y$  – vector of market incomes (and hh characteristics);
- $p$  – policy parameters with monetary values (e.g. benefit amounts and tax thresholds);
- $d(p, y)$  – the tax-benefit rules; a function that derives disposable income.

Total change between two periods:

$$\Delta I = I[d_2(p_2, y_2)] - I[d_1(p_1, y_1)]$$

Could be decomposed

$$\Delta I = \underbrace{I[d_2(p_2, y_2)] - I[d_1(p_1, y_2)]}_{\text{Policy effect conditional on data 2}} + \underbrace{I[d_1(p_1, y_2)] - I[d_1(p_1, y_1)]}_{\text{Other effect conditional on policy 1}}$$

The decomposition depends on conditionality (start vs end-period) and could have multiple combinations (Paulus & Tasseva, 2017). In this case the Shorrocks-Shapley approach of taking the average between combinations was used. It could depend of the size of counterfactual/benchmark indexation ( $\alpha$ ). One can derive the size of policy/other effects relative to  $\alpha$ :

- In nominal terms if  $\alpha=1$ ;
- In real terms if  $\alpha$ =Consumer Price Index (CPI);
- Relative to growth in the economy (approximated by growth in incomes) if  $\alpha$  = average market income increase (MII):

$$\Delta I = I[d_2(p_2, y_2)] - I[d_1(\alpha p_1, y_2)]$$

Policy effect conditional on data 2

$$+ \frac{I[d_1(\alpha p_1, y_2)] - I[d_1(\alpha p_1, \alpha y_1)]}{I[d_1(\alpha p_1, \alpha y_1)] - I[d_1(p_1, y_1)]}$$

Other effect conditional on policy 1

$$+ \frac{I[d_1(\alpha p_1, \alpha y_1)] - I[d_1(p_1, y_1)]}{I[d_1(\alpha p_1, \alpha y_1)] - I[d_1(p_1, y_1)]}$$

Nominal effect

#### Annex 4. Additional result of informality-related simulations.

**Table A-10: Definition of informality by type of job**

Main job			
Employees		The self-employed/Individual entrepreneurs	
j11=1 & (j26!=1   j29!=1)		j11=2   (j26=1 & j29=1)	
Formal employment	Informal employment	Formal employment	Informal employment
j11_1=1 & j10_3=1	j11_1!=1   j10_3!=1	j10_3=1	J10_3!=1
Additional (second) job			
Employees		The self-employed/Individual entrepreneurs	
j41==1		J41!=1	
Formal employment	Informal employment	Formal employment	Informal employment
J41_1==1	J41_1!=1	n/d	J41!=1
Occasional jobs			
		The self-employed/Individual entrepreneurs	
		J56==1	
		Formal employment	Informal employment
		J59_1==1	J59_1!=1

Source: RLMS-HSE-2016.

Notes:

J11. Tell me, please: Does this job belong to an enterprise or organization? I mean any organization or enterprise where more than one person works, no matter if it is private or state-owned. For example, any establishment, factory, firm, collective farm, state farm, farming industry, store, army, government service, or other organization. (1) You work at an enterprise or organization / (2) Not at an enterprise, nor at an organization

J26. Are you personally an owner or co-owner of the enterprise where you work? (1) Yes / (2) No

J29. In your opinion, are you doing entrepreneurial work at this job? (1) Yes / (2) No

J11.1. Tell me, please: Are you employed in this job officially, in other words, by labor book, labor agreement, or contract? (1) Working officially / (2) Not officially

J10.3. Do you think that all the money had been transferred officially? (1) All the money had been transferred officially (2) Part of the money Had been transferred officially part - not (3) All the money had been transferred off the record

J41. Tell me, please: At this job do you work at an enterprise or organization? I mean any organization or enterprise where more than one person works, no matter if it is private or state-owned. For example, any establishment, factory, firm, collective farm, state farm, farming industry, store, army, government service, or other organization. (1) You work at an enterprise or organization / (2) Not at an enterprise, nor at an organization

J41.1. Tell me, please: Are you employed in this job officially, in other words, by labor book, labor agreement, or contract? (1) Working officially / (2) Not officially

J56. Tell me, please: In the last 30 days did you engage in some additional kind of work for which you were paid or will be paid? Maybe you sewed someone a dress, gave someone a ride in a car, assisted someone with apartment or car repairs, purchased and delivered food, looked after a sick person, sold purchased food or goods in a market or on the street, or did something else that you were paid for? (1) Yes / (2) No

J59.1. Tell me, were you employed in this job officially, for example by an agreement, an official contract, or a license? (1) Yes / (2) No

**Table A-11: Distribution of formal and informal jobs and workers.**

		<b>number of jobs, thsd</b>		share of
		formal	informal	informal, percent
first job	employed	41,961	10,337	19.8
	self-employed	2,545	4,329	63.0
	total	44,506	14,666	24.8
second job	employed	914	723	44.2
	self employed		501	100.0
	total	914	1,224	57.3
occasional job	self-employed	625	6,861	91.6
all jobs	employed	42,875	11,060	20.5
	self-employed	3,171	11,190	77.9
	total	46,046	22,250	32.6
		<b>number of people, thsd</b>		share of
		formal	informal	informal, percent
any job		43,340	21,706	33.4
all jobs		45,037	20,009	30.8
primary job		44,506	14,666	24.8

Source: Authors calculations using RLMS-HSE-2016

**Table A-12: Results of behavioral model: odds ratios**

VARIABLES	LABELS	(1) male informal	(2) female informal
informal	LABOR MARKET: informal status status: 0 - formal, 1 - informal	(.)	(.)
dag	DEMOGRAPHIC: age in years	1.005 (0.037)	1.034 (0.041)
dag_2	DEMOGRAPHIC: age squared	1.000 (0.000)	1.000 (0.000)
married	DEMOGRAPHIC: partnered	1.179 (0.248)	0.641* (0.148)
2.dms	DEMOGRAPHIC: Marital (civil) Status = 2, Registered marriage	0.600*** (0.104)	0.922 (0.181)
3.dms	DEMOGRAPHIC: Marital (civil) Status = 3, Separated	1.736 (0.968)	0.943 (0.638)
4.dms	DEMOGRAPHIC: Marital (civil) Status = 4, Divorced	1.761* (0.561)	0.800 (0.188)
5.dms	DEMOGRAPHIC: Marital (civil) Status = 5, Widowed	0.807 (0.534)	0.694 (0.210)
2.deh	DEMOGRAPHIC: Education: Highest Status = 2, Secondary general(=secondary school diploma)	0.749 (0.133)	0.666* (0.160)
3.deh	DEMOGRAPHIC: Education: Highest Status = 3, Secondary vocational(=ptu or teknikum)	0.694* (0.133)	0.541** (0.129)
5.deh	DEMOGRAPHIC: Education: Highest Status = 5, Tertuary	0.417*** (0.086)	0.335*** (0.079)
2.sector	sector = 2	0.495** (0.136)	3.881* (2.962)
3.sector	sector = 3	2.009*** (0.534)	9.371*** (7.123)
4.sector	sector = 4	0.549* (0.170)	1.411 (1.068)
5.sector	sector = 5	9.212** (8.893)	46.196*** (67.498)
n_child	DEMOGRAPHIC: number of children in the household		1.100 (0.112)
n_pens	DEMOGRAPHIC: number of pensioners in the household		0.760** (0.087)
2.drgur02	DEMOGRAPHIC: Region: Type of settlement: 02 = 2, regional centers	1.675** (0.382)	1.159 (0.240)
3.drgur02	DEMOGRAPHIC: Region: Type of settlement: 02 = 3, other urban	1.237 (0.286)	0.676* (0.144)
4.drgur02	DEMOGRAPHIC: Region: Type of settlement: 02 = 4, rural	0.675 (0.179)	0.478*** (0.122)
hhsz	DEMOGRAPHIC: Household Size	1.124*** (0.041)	1.058 (0.061)
ln_wage	INCOME: logarithm of primary employment income	0.779** (0.085)	0.906 (0.067)
Constant	Constant	4.067 (5.411)	0.163 (0.209)
Observations		2,000	2,351

Source: Author's calculations based on RLMS- HSE-2016.

**Table A-13: Results of behavioral model: actual and predicted status.**

		predicted		
		formal	informal	Total
actual	formal	66.4%	7.7%	74.2%
	informal	13.4%	12.4%	25.8%
	Total	79.8%	20.2%	100.0%

Source: Author's calculations based on RLMS- HSE-2016.

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