MODELING AND FORECAST OF SOCIO-ECONOMIC PROCESSES

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Social Policy in a Multi-Regional Agent-Based Model*

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Abstract. In the modern scientific and technological development, the role of the welfare state and the importance of solving the problem of inequality as a manifestation of social injustice is increasing. The purpose of the work is to develop a spatial agent-based model (ABM) in the direction of a detailed representation of social transfers block and the study of the economic agents' behavior in response to the changes of the state's social policy parameters. The isoelastic function of social welfare (FSW), which is based on the households' utility functions with correction factors reflecting the degree of social insecurity, is used to include ethical considerations in the economic analysis and formalize the goals for social justice. The novelty of the work is associated with the study of the dependence on different variants of the benefits structure, taking into account the agents' heterogeneity. The proposed ABM takes into account five main types of monetary transfers: pensions, unemployment benefits, child benefits, poverty benefits, and other

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social transfers. In addition, the experimental calculations consider two additional social benefits: the proportional transfer and basic income. The experimental calculations results show that social benefits are quite successfully integrated into the original ABM, and the main effects of these benefits are fully manifested in it. The relative characteristics of individual benefits differ significantly from the point of view of certain concepts of social justice and the corresponding changes in the FSW. By the example of the ratio of child benefit to the poverty benefit, it is shown that the effect in terms of the FSW at high levels of inequality rejection is achieved only through the complex use of transfers.

Key words: state's social policy, function of social welfare, social justice, public goods, social benefits, agent-based modeling.

1. Introduction

In the modern scientific and technological development, the role of the social welfare state and the importance of solving the problem of inequality [1] as a manifestation of social injustice is increasing[1]. At the same time, moral, ethical and value issues are constantly in the spotlight. Since the middle of the last century, the importance of "ethically-oriented" tradition in the economic science has been increasing, according to Sen's formulation [2, p. 17]. This is also evidenced by the spread of a new term designating economic theory as a "moral science" [3; 4].

The approach of social justice in economic analysis that was widely adopted in the middle of the last century, focusing on the redistribution of income and wealth through government intervention, has retained its significance in the new Millennium (see, for example, [5; 6]). A disturbing picture of social inequality and injustice consequences is drawn by the Nobel prize-winning author, J.D. Stiglitz: "We are, in fact, paying a high price for our growing and outsize inequality: not only slower growth and lower GDP but even more instability" [7, p. 14]. The theories of the public sector and Welfare State [8; 9] suggest a variety of social policy measures reducing inequality through a certain combination of taxes and transfers (see, for example, [10; 11]).

The development of economic and mathematical tools allowing to obtain quantitative estimates of changes in social priorities and the formation of appropriate social redistributive policies remains an unsolved problem. The proposed article takes a step towards its solution based on the application of an agent-based approach creating wide opportunities for computer modeling of the autonomous agents' behavior. The purpose of the work is to develop a spatial agent-based model (ABM) in the direction of a detailed representation of social transfers block and the study of the economic agents' behavior in response to the changes in the structure of social benefits as a component of the institutional environment. The novelty of the proposed approach is related to the experimental study of the function of social welfare depending on a wide range of social transfers, taking into account the agents' heterogeneity (heterogeneity in property ownership and resulting heterogeneity in income, distribution of households by the number of children, and other important differences in households' characteristics). Such tools allow to model the individual household's social vulnerability.

[1] *The World Inequality Report 2018. World Bank, 2018.* 157 p.

2. Redistributive and social policy in agent-based models

Modern economic ABMs along with private agents (firms and households) take into consideration two groups of government agents: state-owned enterprises (organizations, institutions, or agencies) providing different public goods at the microeconomic level, and governments of appropriate levels of the budget system and extra-budgetary funds, carrying out economic policy at the macro and meso levels (a more detailed overview of the existing government modeling approaches in ABM is presented in [12]).

A group of models originally created within the framework of the Eurace project at seven European universities should be mentioned among the foreign ABMs including a fairly detailed representation of the state [13]. In the future, other models were developed on the same platform, in particular Eurace@ Unibi [14]. The model's authors note that the government involvement is associated with redistributive functions and appropriate social policy. Social spendings of the expanded government include unemployment benefits and "various transfers and subsidies to firms and households, which can be used or not depending on the experiments on the policy option under study" [14, p. 38]. In most other foreign macro-economic ABMs, government transfers are limited to unemployment benefits only, for example, in such well-known models as ASPEN [15], Lagom [16; 17].

Spatial ABMs usually represent the government through the division of various levels of the budget system. In the work of Tsekeris and Vogiatzoglou [18], the decision-making of different governments is carried out in accordance with different FSWs. In contrast to the traditional dependence on utility functions, the FSWs proposed for the central government depend on the overall efficiency and territorial equity of the cities, and those for local governments depend on the performance indicators of urban development in the relevant territory and the local residents' well-being.

Among Russian ABMs, the government is represented in a more detailed way, including social organizations and expanded governments that implement social policy at various levels of the budget system. First of all, this applies to the work of a group of researchers from the Central Economic and Mathematical Institute of the Russian Academy of Sciences led by the Academicians V.L. Makarov and A.R. Bakhtizin (see, for example, [19; 20]). The spatial aspect of economic ABM is developed by the research team of the Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences under the leadership of V.I. Suslov, who proposed an agent-based input-output multi-regional model, first taking into account only private agents [21], and then including the government [12]. The article presents this model's development taking into account redistributive social policy.

In the study of A.R. Bakhtizin [20], the government is considered in the framework of a hybrid model that combines not only ABMs, but also the calculated models of general equilibrium and neural networks. At the same time, the united government is singled out as a separate agent, forming expanded budgets at all levels and spending on state final consumption. The provision of goods and services by this agent is generally characterized by non-competitive (as a defining feature of public goods), but this important feature is not taken into account in the model.

The level of municipalities in the region is studied in the work of V.L. Makarov, A.R. Bakhtizin, E.D. Sushko [22]. The organizations

in the fields of education, health care, science and public administration are identified in the proposed ABM as separate agents and are financed from the municipal budget in accordance with the budget security standards. In the considered ABMs, the government uses collected taxes for the solving efficiency problems and the corresponding financing of state-owned enterprises (social organizations), forming the government final consumption. However, the non-competitive property of goods provided by these enterprises is not taken into account. Thus, at the model level, the issue of making effective endogenous decisions in the public sector remains open.

Let us consider the approaches to accounting for the government redistributive policy in agent-based models in more detail. Despite the potentially wide range of policy directions outlined above in the Eurace@Unibi model [14], the main research in the field of government intervention is connected with direct stimulation of economic growth. For this purpose, only two specific types of transfers are proposed to use: subsidies for employees' training and investment subsidies to firms. In later versions of the model, the spatial aspect is taken into account on the example of different variants of technological policy. In [14], a community from two regions that differ in the level of technological development is studied. Targeted subsidies are provided to the firms in developing regions to finance investments in physical capital and purchase high-tech investment goods. The total amount of subsidies is financed from the community's general funds, which are formed from regional contributions in proportion to their GDP. Along with the subsidies to firms, the transfers to households are also taken into account, and in this case the positive effect of technological policy is enhanced [23].

The problems of inequality in agent-based models are also considered in a direct relationship with the levels of economic development. The paper [14] was one of the first publications that examines the mechanisms of various types of inequality, including not only income and wealth, but also the characteristics of the labor market, education, health care, migration and gender factors, with an emphasis on the relationship between technological changes and the level of personnel qualification. Almost simultaneously, a paper on modeling the relationship between income inequality and financial instability was published [17]. It shows that different variants of income distribution (between profit and wages) significantly affect macroeconomic indicators. At the same time, the government fiscal policy is quite effective, especially when income is redistributed in favor of profit in comparison with wages. We should note a fairly simplified representation of fiscal policy, in which government spending is directed only to the payment of unemployment benefits. In general, there is a tendency to increase the importance of moral and ethical priorities and the corresponding redistributive social policy, in this regard, the relevance of research using agent-based models is also increasing.

3. Agent-based multiregional input-output model (ABMIM)

3.1. General model structure

The ABMIM model identifies five main groups of agents: households, private and state-owned enterprises, governments at different levels of the budget system, and the Pension Fund. At the micro-economic level, there are three main groups of agents: households consuming private and public goods and supplying labor, firms producing private goods, and public enterprises producing public goods.

A variant of the spatial multiregional input-output model used in experimental studies of social policy includes three regions (West, East, and Center), 300 households, 150 firms (when forming production and technological sets and processing information, combined into four industries for the production of private goods), one generalized state enterprise responsible for transport services, and one generalized state enterprise, producing one type of public goods and corresponding the industries with the numbers 52-56 of the Russian Classification of Products by Economic Activities of the input-output balance of RF (including public administration and military security, education, health and social services).

At the macro- and meso-economic levels, the government is represented by a group of agents including federal and regional governments, as well as the Pension Fund. Thus, government agents' task is to ensure both economic efficiency and social justice. In this study, regional governments and regional public goods were not included in the current version of model.

In the following, we will briefly consider the components of the proposed model related to the implementation of social policy[2].

3.2. Households modeling

The utility function of each household $h = 1, ..., H$ consists of two groups of terms related to the consumption of private goods in volume x_{ih}, $i = 1, ..., N$, and public goods in volume g.

The Cobb-Douglas functions were used as utility functions in our model (the more general ABMIM model assumes the use of the more general CES function). The initial utility is multiplied by a reduction coefficient θ_h taking into account the characteristics of households in terms of family composition and social assistance needs:

$$U_h(x_{1h}, \dots, x_{Nh}, g) = \\ = \theta_h \cdot exp\left(\sum_{i=1}^{N} k_{cih}\, ln(x_{ih}) + k_g\, ln(g)\right). \quad (1)$$

The coefficient for the utility function θ_h can be interpreted as the degree of insecurity (more precisely, the non-monetary component of social insecurity). If $\theta_h < 1$ and all other things being equal, such a household requires a higher income to achieve the same level of utility as at $\theta_h = 1$.

In the case of child allowances, they differ for families with one child, two, three or more children. Households with the exception of pensioners were divided into four groups: childless, with one, two, three or more children. The number of the corresponding households and the ratio of payments in each group were set based on real statistical data in Russia for the year of 2015[3]. As a result, the distribution into four groups was obtained. The calculations for each of the four groups use the corresponding decreasing coefficients θ_h, which are equal to one for childless families and less than one for other groups of families in an increasing degree when the number of children in them increases.

Besides, the coefficients θ_h for some households were lowered even further to reflect the health problems of family members and other adverse factors. In the case of other social benefits, they reflect differences in the potential need to provide funds for medical expenses, health resort treatment, payment for individual utilities, material assistance, and other transfers supplementing social insurance payments. Decreasing coefficients are taken into account in the state's behavior when providing child benefits and social assistance.

[2] The source ABMIM model is analyzed in more detail, for example, in [21], a later variant of the model taking into account the State's activities is presented in [12].

[3] *Social status and standard of living of the Russian population. 2017:* stat. coll. M.: Rosstat, 2017. 332 p.

Families of pensioners and the unemployed are set apart as separate households along with the families of the working population. They receive corresponding transfers from the Pension Fund and the Federal budget.

3.3. Government modeling

State-owned enterprises provide the production of public goods, as well as transport services, in the current version of the model. Like private firms, their production capabilities are described by Leontief-type production functions, and they present a corresponding demand for labor, capital, and private goods used in production. The product price is set at a level providing a fixed margin level above the costs, which includes capital expenditures for maintaining production capacity. As a result of the margin, state-owned enterprises receive profit, which is then transferred to the budget.

Pensions in the model are paid by the Pension Fund by means of insurance contributions. The Pension Fund's income is fully spent on pension payments, so the Pension Fund's budget includes income equal to expenses and no inter-budget transfers are required. Pensions are paid in accordance with the certain fixed proportionality, which are responsible for pay differentiation. A random distribution of coefficients is used, which models the existing variation in the pensions size.

The government is implementing the state policy due to a combination of budgetary expenditures and revenues. Budget expenditures E consist of two parts:

$$E = G + S. \quad (2)$$

Here G is the government expenditures on final consumption, which are formed as a result of purchases of public goods g from state enterprises (at a price p_g):

$$G = p_g g. \quad (3)$$

The government also provides transfers S to private agents. Such transfers can be used to redistribute income and wealth and, ultimately, achieve social justice goals. In this study, we will look at this part of the government activity in more detail.

Government revenues R are generated in the model from the profit of state-owned enterprises B and taxes T: income tax, profit tax, VAT and payroll tax. Budget deficits are not taken into account in the considered versions of the model, the planned level of income is limited to tax receipts and profits of state enterprises:

$$R = T + B. \quad (4)$$

At this modeling stage, we use the simplifying assumption that the budget deficit was not considered, so the condition $E = R$ was met.

3.4. Social transfers modeling

The main variants of this model take into account five main types of social transfers in monetary form:

$$S = S_s + S_u + S_c + S_p + S_a, \quad (5)$$

where S is total social transfers, S_s – pensions, S_u – unemployment benefits, S_c – child benefits, S_p – poverty benefits, S_a – other social transfers.

Since pensions pass through a separate balanced budget in the model, this aspect of the government activity is not considered in detail in the article. The social spending S_x for each benefit x ($x = u$, c, p or a) is a fixed amount β_x of public expenditure E and is then distributed between different households $h = 1, ..., H$:

$$S_x = \beta_x E = \sum_{h=1}^{H} S_{xh}, \quad (6)$$

where S_{xh} is the benefit of type x provided to household h.

The solution of social problems is connected not only with the volume of allocated funds, but also with the nature of their distribution among those in need. The main principle of social transfers distribution in the model is as follows. Each household h is characterized by a non-negative differentiation coefficient C_{xh}, according to which it should be paid a transfer of type x. If the household is not entitled to this payment, then $C_{xh} = 0$. Accordingly, the amount of money S_{xh}, that a household h receives is equal to:

$$S_{xh} = C_{xh} S_x / \sum_{j=1}^{H} C_{xj}. \quad (7)$$

Let us look at the features of the main social transfers.

Unemployment benefits are distributed equally among the respective households. Thus, $C_{uh} = 1$ for the unemployed and $C_{uh} = 0$ f or the rest. If H_u is the total number of the unemployed, the amount of the benefit paid (for those who are entitled to it) is equal to:

$$S_{uh} = S_u / H_u. \quad (8)$$

Maternity and child benefits are allocated only to families with children and vary depending on the number of children. Households with the exception of pensioners are divided into four groups by the number of children. These benefits are not paid to the first group of childless families, as well as to pensioners, i.e. $C_{c,h} = 0$. The amount of the benefit for the second group of families with one child serves as a base, i.e. $C_{c,h} = 1$. When the number of children increases, monetary payments to families increase and remain until the child reaches the age of three (*Table 1*).

Poverty benefits are calculated on a slightly different basis (i.e. formula (7) is not used). For household h, the transfer value is

$$S_{ph} = \max\{Inc^* - Inc_h, 0\}, \quad (9)$$

where *Inc** is the stated minimum income level ("poverty line"). The value *Inc** is set so that the total poverty benefits are equal to the specified amount:

$$S_p = \sum_{h=1}^{H} S_{ph} = \sum_{h=1}^{H} \max\{Inc^* - Inc_h, 0\}, \quad (10)$$

Other social transfers are calculated in the same way as child benefits *(Table 2)*. The households were divided into ten equal-sized groups, distributed in ascending order of the corresponding payments, and then normalized so as to obtain a total value of the payout ratios equal to 10.

Table 1. Initial data on child benefits

Number of children	1	2	3
Share, %	15.6	14.9	3.5
θ_h	0.667	0.500	0.400
C_{ah}	1.000	2.194	3.292
Sources: authors' calculations; Social status and standard of living of the Russian population. 2017: stat. coll. M.: Rosstat, 2017, 332 p.			

Table 2. Initial data on other social benefits

Group no.	1	2	3	4	5	6	7	8	9	10
Share, %	10	10	10	10	10	10	10	10	10	10
θ_h	0.5	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0
C_{ah}	2.81	1.87	1.51	1.20	0.94	0.70	0.50	0.31	0.15	0.00
Source: authors ' calculations.										

In addition to the basic benefits listed above, the experimental calculations considered two additional transfers allocated to households after deducting pensions and unemployment benefits from the funds allocated for social policy: pseudo- benefit and universal basic income.

Pseudo-benefit (S_f). For comparability of calculations, the initial variant of the model includes a money transfer distributed among the households in proportion to their income. If we use the definitions of formula (8), then for this transfer we should take $C_{fn} = Inc_h$, where Inc_h is the amount of income of the h^{th} household before receiving the benefit.

This distribution principle corresponds to the principle of tax neutrality, when the government collects money, but does not spend it for social purposes, and simply gives it back to the economy in a way that distorts the economic incentives for agents to a minimal extent. In particular, neither the income structure nor the Gini coefficient changes after such a transfer. It does not reduce economic inequality, and cannot be called social in the usual sense.

Universal basic income (S_b). In this type of social support, each household is guaranteed to receive a certain amount of money without checking the need or any additional conditions. Thus, this type of transfer is based on the rejection of social support selectivity principles and is widely discussed both in theory and in practice (see, for example, [24]). If we use the notation of formula (8), we can simply set $C_{bh} = 1$ for any household h. Unconditional basic income does not take into account the differentiation of the families' material situation, but it is more significant for the poor than for the rich, since it makes up a higher share of total income for them. Therefore, payments of this benefit correspond to the traditional ideas of social justice and reflect the trend of expanding social benefits, regardless of the differences in the initial position of the recipients observed in recent years.

The additional transfers considered are included in the total amount of social transfers, along with those that were included in it earlier in formula (5).

3.5. Economic indicators for assessing social policy

The modeling of budget and social policy choice in our study is carried out in accordance with a modified variant of the isoelastic function of social welfare (FSW) which depends on the values of the utility function of individual households:

$$FSW = \left(\frac{1}{H} \sum_{h=1}^{H} U_h^{1-\nu} \right)^{1/(1-\nu)} . \qquad (11)$$

This FSW is the power mean of individual utilities with a degree $1-\nu$, where $\nu > 0$. The value ν can be interpreted as the coefficient of inequality rejection. If $\nu = 0$, FSW is equal to the arithmetic mean of the utilities, which corresponds to the utilitarian (Bentham) criterion reflecting distributional indifference. In the limit if $\nu \to 1$, this is the geometric mean, which corresponds to the Bernoulli-Nash criterion. If $\nu = 2$, this is the harmonic mean. In the limit if $\nu \to \infty$ the formula gives the minimal value, which corresponds to Rawls' criterion. Thus, changing the parameter of ν in the limits from 0 to infinity allows us to formalize the entire range of representations of justice from the utilitarian to the Rawls' ones.

The model uses *the Gini coefficient* to monitor income inequality in the population. Let us assume that Inc_h is household's h income ($h = 1, ..., H$), and r_h is the rank of this income in ascending order (i.e., the lowest income is assigned rank 1, and the highest one – rank H). Then the Gini coefficient is by definition equal to:

$$\sum_{h=1}^{H} (2r_h - H - 1) Inc_h \Big/ \left(H \sum_{h=1}^{H} Inc_h \right). \qquad (12)$$

A coefficient value close to zero means that income is distributed evenly. Here we should be aware that income inequality is not the same as inequality in levels of wealth and living conditions. There may be people with an average income level, but with a low level of well-being in a society (for example, due to health problems or high prices in the place of residence).

4. Experiments with social transfers

4.1. Experimental calculations scheme

The considered isoelastic FSW is proposed to be used for choosing the optimal budget and social policy when studying the consequences of changes in the share of various social transfers (and in the future, tax rates). When constructing this function, we take into account the composition of families and the decrease in utility with the probability of unfavorable social circumstances.

The following approach was used in the study to measure the effects of various alternative social policy options and to ensure comparability of the corresponding variations of experimental calculations. First, the tax rates in all variants remained unchanged. Second, the overall share of transfers in budget expenditures was maintained at a constant level, so that the structure of budget expenditures remained unchanged in terms of the ratio of transfers and purchases of public goods.

As a starting point for the experiments with benefits, the authors considered a case when the government pays only two transfers: unemployment benefits (5% of expenditures) and pseudo-benefits (25% of expenditures). The remaining budget expenditures are allocated to the public goods purchase. Then, from option to option, the pseudo-benefit is completely or partially replaced with one of the rest social benefits. The effects of such substitution are analyzed by various indicators, primarily by the FSW size with different coefficients of inequality rejection.

In experimental calculations, a static version of the model was used, when production capacity and other initial parameters of the economy are at the same level. Within a single run (300 model periods), after a rather large number of periods, the model comes to a state of quasi-equilibrium, for which we can find the values of the economic indicators characterizing the results of economic policy.

4.2. The main results of the calculations

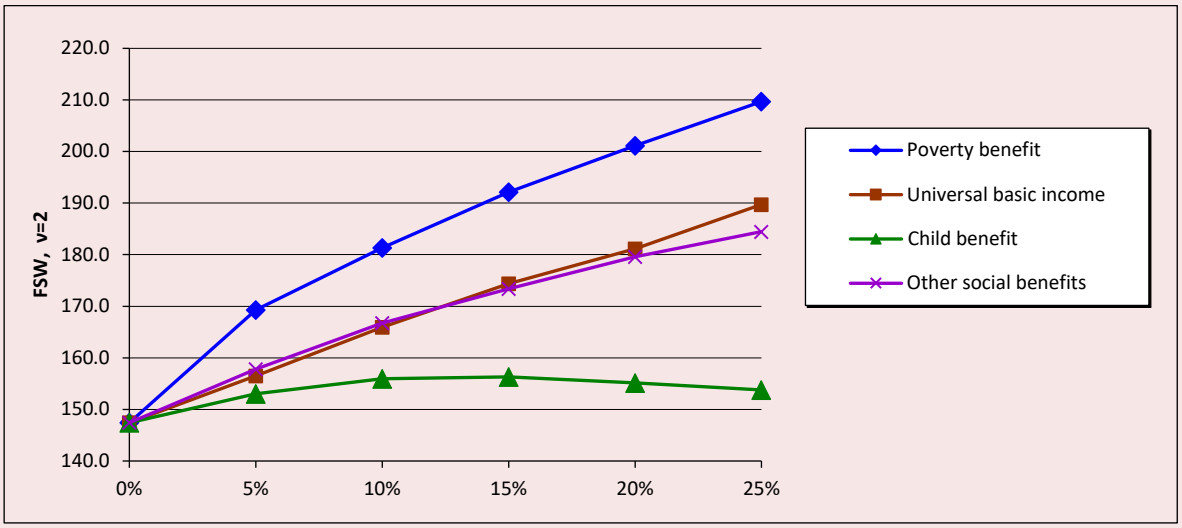
The results of the experiments are shown in a series of diagrams *(Fig. 1–4)*. All graphs reflect the dependence of one of the resulting indicators on the share of expenditures for one of the four benefits.

As you can see, the FSW with the parameter $v=2$ increases as the share of three social benefits increases (*Fig. 1*). This effect does not work with a large share of the benefit only for child benefits. The FSW growth shows that social benefits are really useful from the society's point of view as a whole, if the society strives for social justice and assistance to socially vulnerable citizens.

In the FSW diagram with the parameter $v=0$ (*Fig. 2*), we see that the poverty benefit and the universal basic income, which are reduced to a net income redistribution, are neutral in terms of the impact on public welfare, since the society here is indifferent to inequality, its goals are purely utilitarian.

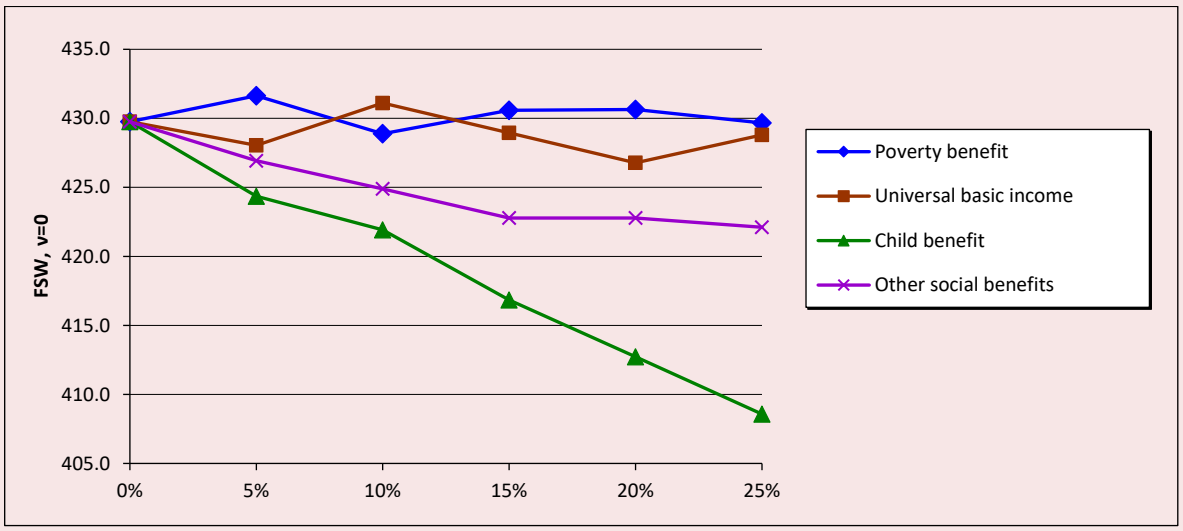
For other social benefits and child benefit, there is an effect of the utilitarian FSW fall. This phenomenon is explained by the fact that these benefits redistribute income in favor of those having a low coefficient of utility. The ruble transferred to such households gives a smaller increase in utility than the ruble transferred to households with a coefficient equal to one. Thus, from a purely utilitarian

Figure 1. FSW if $v = 2$, depending on the specific weight in costs



Source: authors' calculations.

Figure 2. Utilitarian FSW ($v = 0$) for four benefits, depending on the specific weight of each benefit



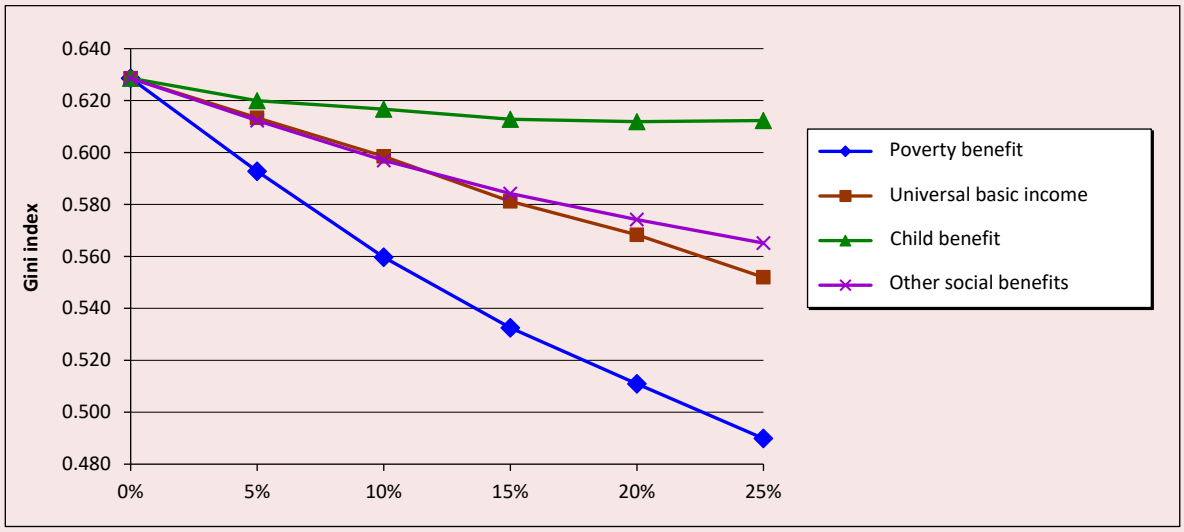
Source: authors' calculations.

point of view, society should not help socially unprotected citizens.

Further, as shown in *figure 3*, all benefits slightly reduce the Gini coefficient, which is a measure of income inequality. With low incomes, the lower the household's income, the higher is the amount of the poverty benefit, so the effect of this benefit on the Gini coefficient is very strong; this benefit is aimed specifically at reducing inequality. The size of the other three benefits does not depend on household's income, so they equalize income to some extent when compared with pseudo-benefits, but not as much as the poverty benefit.

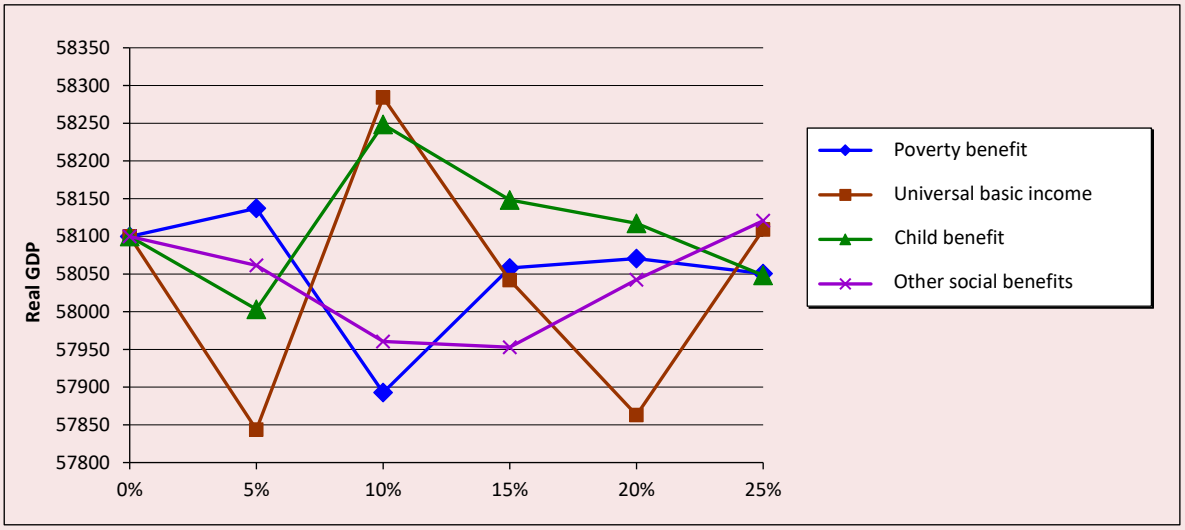
Finally, *figure 4* shows that the increase in the share of social benefits has almost no effect

Figure 3. Gini coefficient for four benefits depending on the share of the benefit in expenses



Source: authors' calculations.

Figure 4. Real GDP depending on the benefit's share in the expenditures



Source: authors' calculations.

on the GDP value. GDP fluctuations in the experiments were random, and the fluctuations size is not very large. This indicates that the scheme of our experiments was chosen correctly. Changes in the economy with the introduction of social benefits resulted mainly in the redistribution of the product between households in favor of the needy, without affecting the size of the product itself.

The conducted analysis makes it possible to compare the poverty benefit and the universal basic income. In terms of reducing inequality and increasing the non-utilitarian FSW, the poverty benefit works more purposefully and is the preferred option. Thus, the use of the universal basic income should be justified by some other considerations involving effects that go beyond the scope of our ABM.

4.3. Experiments with inequality rejection

In previous experiments, we considered isoelastic FSW only if $v = 0$ and $v = 2$. Let us now conduct a more detailed analysis that reveals the role of the parameter v in choosing the benefits structure. To do this, we shall fix the total share of the poverty benefit and child benefit in budget expenditures at the level of 25%. The rest of the experiment conditions are the same as above.

Figure 5 shows the relative level of the FSW depending on the share of child benefit at different values of v ($v = 0$, 2, 10 and 100). The level of 100% was taken as the value of the FSW in a situation where child benefit is not paid and all 25% is accounted for by the poverty benefit.

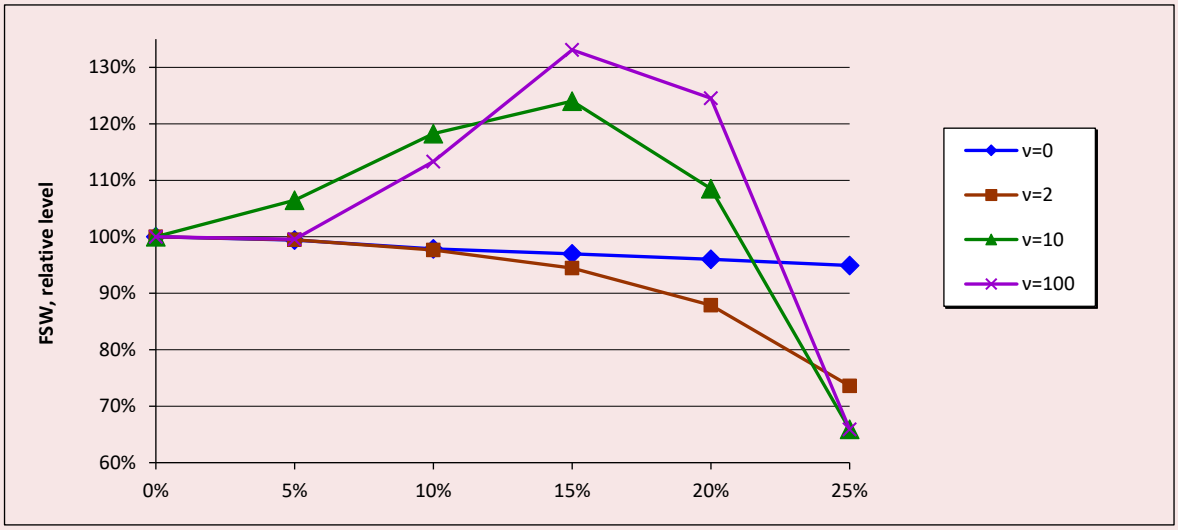
When $v = 0$ and $v = 2$, the child benefit "loses" to the poverty benefit. However, at higher values of v (10 and 100), the choice becomes less unambiguous. At first, as the child benefit's share grows, the FSW increases, but when this share increases to the level of 15% or higher, it begins to fall sharply.

This analysis makes it possible to conclude that the importance of child benefit in terms of ensuring social justice is shown only when there is a sufficiently large rejection of injustice by society. In addition, these experiments show that at high values of v, neither benefit has an unambiguous advantage in itself; the greatest effect is achieved by using two benefits simultaneously.

5. Conclusions

The presented paper reveals the possibilities for using the function of social welfare approach in the analysis of social policy. They form the basis of the theoretical significance of the research. Attention is focused on how changes in various social transfers affect the household agents' well-being. In order to provide the experiment purity a static version of the model was used, where the production capacity of the economy and other key parameters remain at the same level. After a sufficiently large number of periods, the model comes to a state of quasi-equilibrium, for which the values of the

Figure 5. FSW depending on the share of child benefit for a combination of poverty benefit and child benefit at different values of v



Source: authors' calculations.

economic indicators characterizing the results of economic policy are determined. First of all, the dependence of the function of social welfare (FSW) on various variants of the benefit structure was considered.

The study is based on an ABM of a relatively complex structure, including intersectoral, interregional and spatial effects. It turned out that social benefits are quite successfully integrated into this model, and the main effects of the benefits are fully manifested in it.

The transfers distributed among the households in proportion to income do not reduce economic inequality, and they generally have no social component. The transfers that have been widely discussed in recent years, which model universal basic income, are not based on the selectivity requirement that is usually imposed on social support.

If society is sufficiently intolerant of social injustice, then social policy should be comprehensive. This thesis is clearly confirmed by the experiments with a combination of child benefit and poverty allowance. Each of these benefits in itself can lead to a significantly lower level of well-being than their combination, but this effect is manifested only when there is a sufficiently high level of inequality rejection v of the isoelastic function of social well-being.

In the future, using the developed methods for assessing the consequences of changes in the structure of various social transfers, it is proposed to approximate the parameter of inequality rejection in the isoelastic FSW, corresponding to the actual social policy that has developed in the Russian economy. This will show how much social injustice and inequality is actually unacceptable in the society. In addition, the model structure allows to analyze in more detail other important aspects of social policy, such as spatial inequality, the relationship between the federal and regional levels, the relationship between generations, and long-term changes depending on the management of public debt.

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