Statement of the problem

Introduction. In the article we dwell upon the problems connected with the impact of interbudgetary relations on the fiscal behavior of regional authorities. Alongside with that we will also regard such parts of interbudgetary relations structure as expenditure and revenue assignment between the Federal Center and the regions (inclusive of setting proportions of tax revenue sharing) as well as its effect with the regional authorities' fiscal behavior, its influence upon the interbudgetary relations stability, and the mechanism of intergovernmental financial aid to the regions in need.

The economic policy pursued by the regional authorities comes to be largely determined by the features of the existing system of intergovernmental fiscal relations (IGFR). The mechanism of interbudgetary relations as well as distribution of tax authorities together with tax revenues between the Federal Center and the regions prove to intensify fiscal incentives within the regions, the latter attained both by means of local or regional tax revenue increase and fiscal administration improvement alongside with the tax base growth facilitated by the economic activity within the region. It does quite in the same manner that the peculiar features of IGFR focused on exert an influence upon the structure and the efficiency of regional budget expenditures.

Further on, the model being shaped, it will be assumed that the rules of revenue base formation are common to all the regions as well as the methods of financial aid amount calculation be established by the federal authorities. The decisions concerning both the regional budget revenue formation and the procedures of financing the corresponding expenditures are made by the regional authorities, with reliance on the above-mentioned rules. It is assumed that the decisions made by the regional authorities be based on the purposes of securing maximum public support, which results from the status and structure of public goods allocation within the region and the tax incidence level (level of regional tax rates, scope of tax incentives levied by the regional authorities) as from the basic criteria for the regional authorities' evaluation. Consequently, it can be assumed that there occur a certain correlation between preferences of regional authority and of the regional population, which is natural for the election-based political system. Such correlation must be sustained after local elections for it provides political public support for the regional authorities and tells on the possibility of being re-elected for the next term.

Interests of the regional leader and other economic agents in the region. In the regional authority structure the regional leader, whose formal status is largely determined by the Constitution adopted in the corresponding Federation Subject (the Governor, the Head of the Republic, etc…) is of primary importance. The regional leader's behavior and interests mostly shape regional fiscal policy. Therefore it is provided that the most important economic agents' groups, which might exert an influence upon the regional leader's behavior, be defined.

Firstly, one of these groups comprises the regional electorate. The electorate interests may take effect with securing the regional leader position at the next elections. Besides, the leader supported by the electorate may be less dependent on the other economic agents' groups inclusive of the federal authorities. The latter considers the local public support to be a deciding factor for the regional leader's success and consequently – for the attitude of the Federal Center towards the leader.

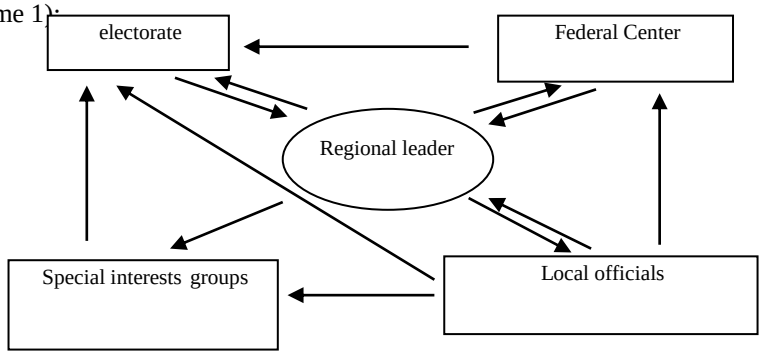
Secondly, it is essential that local big business influence as well as special interest groups effect with the regional leader be mentioned. Such special interest groups may determine the regional economic policy both by lobbying some decisions through the legislative (representative) and executive authorities and by shaping the voters' electoral behavior through electioneering technologies. The regional elections result may largely be influenced by sponsoring the election campaign as well as by initiating or discouraging the electorate from the demonstration of either support or protest against the authorities' behavior, etc.

Thirdly, the political position of the regional leader depends upon the attitude (to the leader) assumed by the Federal authorities. In most cases it is possible that the Federal Center support be a deciding factor in making a success of the elections. It can result from the encouraging the electorate by the financial aid promise and future federal support in solving local problems as well as from the leader's growing independence from big business and local municipal officials, which enables the leader to exert a more effective influence upon these groups.

Another group determining the behavior of the regional leader comprises both local officials and bureaucrats subordinate to the regional leader and government officials formally subordinate to the Federal Center but informally dependant on the regional authorities. Such local officials take an active part in making decisions, which shape the regional fiscal policy. Therefore they can wield a profound influence on taxation level and tax policy, tax administration quality, regional budget expenditure structure and efficiency, price formation, as well as they can provide for or against the development of free enterprise and

etrepreneurship in the region. At the same time by taking part in the election campaign they can determine the results both of local and federal elections. It's local officials who are provided with detailed information about the region, who keep the Federal Center informed and might arrange the information to be offered.

Shaping economic policy, the regional leader must take into consideration diverse local officials' interests so that the latter would pledge solid support. These interests might be sustained by salary growth, non-cash privileges, accommodation supply, project support received by an affiliated with the officials persons and entities, extra-budgetary funds set up for the purpose of financing regional administration, etc. To crown it all, a scheme of interrelations between the groups mentioned above and the regional leader can be concocted (see scheme 1):



The Correlation between Fiscal Policy and the Level of Public Support for the Regional Leader. Now, taking into consideration the correlation between the regional authorities' interest and economic agents' groups mentioned above, we could thoroughly examine fiscal policy influence upon the level of public support for the regional authorities.

As it was mentioned above, we can proceed from the assumption that the electorate interest as well as the support level for this or that regional leader is determined by economic agents' welfare level. The wlefare level (actual or desired) largely depends upon the fiscal policy (declared or implemented). Producing public welfare and keeping control over disposable public income through taxation and income transfers (university grants and scholarships, pensions, social subsidies etc.) attains the fiscal policy influence upon the electorate welfare level. Therefore, regional budget expenditures and its efficiency/effectiveness,

which determines both the amount of public and private goods promoted by chosen taxation level under the fixed income condition, come to be a deciding factor in electorate behavior and support for the regional authorities. It can be assumed that the level of public support for the regional authorities be increased alongside with the public welfare growth as well as adaptation of public and private goods structure for the population priorities.

a) Regional public revenue and expenditure level. On the one hand, regional income level is determined by economic activity level, which depends upon both regional output potential and economic policy of the authorities essential for economic conditions defined by business institution system development (legislation and its stability, instruments for legislative norms and contract liabilities enforcement, the degree of bureaucrats' corruption, social system and production infrastructure development, etc.). On the other hand, given taxing power of both the Federal Center and the regions fixed the regional revenue level depends upon tax policy pursued by regional authorities. Own revenues of regional budgets (regional and local taxes, federal taxes or their shares accrued to regional and local budgets) are determined by the rate level attained through tax privileges and tax administration level. The latter is defined by tax arrears level as well as by usage of non-cash forms of tax payments (various offsets). Alongside with that regional budgetary revenues are determined not only by own tax revenues but by the amount of federal financial aid (transfers from federal fund for financial support to regions, subventions, budget loans, resources allocated through mutual settlements[1], etc.)

Regional authorities' aspiration for tax revenue increase exerts a negative influence upon the level of public support for regional budget revenue increase imposes a growing tax burden on the population. On the contrary tax burden relief attained by rate reduction and tax privileges as well as delay in tax payment allowed secures positive attitude revealed by the economic agents. Alongside with that it must be assumed that revenue decrease contradicts the authorities' aspiration for the high level of public goods production level. Such aspiration is determined by the fact that public goods provision growth and adaptation of its structure for social needs gain growing public support.

Therefore, the choice of tax rates in the region is based on a compromise between aspiration for budget revenue increase on the one hand, which fosters pub-

[1] "Funds distributed through mutual settlements" is an additional channel of financing federal financial aid to the regions which proved to be totally non-formalized, the inter-regional distribution of those not being envisaged by the annual budget law.

lic goods provision growth and consequently secures a high level of public support for the authorities, and tax burden growth imposed on enterprises and the population of the region on the other hand, which provides against the public support and in the long run exerts a negative influence upon economic activity and consequently the level of budget revenue.

Besides own tax revenues regional expenditures are covered by federal financial aid provided from the federal budget (almost all the Russian regions receive federal financial aid in this or that form) and regional debt amount increase[2]. Providing the regions in need with federal financial aid appeared to be a complicated and shaky system of settlements and agreements based on hierarchy bargaining between different levels of executive and legislative authorities. Under the conditions of Russian economy the whole procedure resulted from the necessity for covering at least partly (to the extent federal budget could allow) the gap between regional budget expenditures and revenues agreed with the Federal Center.

But for the formal methodology of federal financial aid amount calculations, which in the first years of its existence were based on the equimarginal principle applied to RF subjects forecasted revenues and expenditures[3] [2] (according to the funds assigned for the purpose of interbudgetary equalization), up to 1998-1999 there were no objective methodology for such calculations. Under such conditions federal financial aid amount depended both upon regional forecasted revenues and expenditures agreed with (and approved by) the Federal Ministry of Finance and upon lobbying activity on behalf of regional interests during the Parliamentary discussion of federal budget law for the next fiscal year. Besides regular financial aid, the allocation of which is fixed by federal budget law, there are many kinds of irregular financial aid (funds distributed through mutual settlements, budget loans and others), which are distributed between the regions during budget execution on the basis of federal executive authorities' decisions. It is obvious that the possibility of receiving irregular financial aid as well as its

[2] Regional debt value is defined by both the capacity of the regional authorities to gain financial aid (federal loans are also regarded as a kind of financial aid for in most cases they prove to be partially or totally free and unrepayable) and loan value restrictions imposed by budget legislation. Accumulation of outstanding credit liabilities practiced by regional authorities proves to be another specific form of regional deficit financing. But the problems connected with subfederal loans make up a subject of another investigation and are not considered in this work.

[3] See *I. Trunin "Record of Interbudgetary Relations in Russia"*, Moscow: IET, 2000, http://www.online.ru/sp/cepra

amount largely depend upon the regional authorities' ability to convince the Federal Center of the necessity for gaining additional financial support regardless of having any objective background for such demands.

Therefore, the level of regional budgetary revenues is determined by diverse parts of tax system and IGFR structure, which shape both the degree of possible regional influence upon income earned and the degree of the regional authorities' interest in local budget revenues growth. If either financial aid or federal tax sharing rates could change so that it would compensate for interregionalown revenue fluctuation, regional authorities would have no incentives to increase the latter.

Further on it will be assumed that the amount of financial aid to the region be defined by the gap size between regional own revenues and its expenditure needs. Besides, regional revenue calculation can be based upon either actual budget revenues or revenue capacity, i.e. revenues, which might be earned in the region through setting average tax rate and applying average tax efforts concerning the existing tax base. The same way regional expenditure needs can be defined on the basis of both actual (reported) expenditures and some standard regional expenditure needs estimation derived from national average regional expenditure level as well as existing price-rate and some specific factors determining needs in public goods provision (the climate and other geographical factors, sex-age structure, scale effect, population allocation between rural and urban areas, etc.)

b) The impact of tools and institutions used for budget execution upon the level of public support for the regional authorities. Besides public and private goods provision level and structure, the level of electorate support for the regional authorities can be determined by the factors characteristic of budget execution tools system. These factors appear to be of vital importance for special interests groups.

If it is assumed that the objective of regional big business is to maximize its after-tax income then this desire could be satisfied by regional authorities both through regional tax rate modification and tax privileges offer as well as through choosing another qualitative level of tax administration. Under the condition of loose control exerted over tax liabilities exposure, the risk of tax breach exposure is lowered, which secures after-tax income growth attained by tax dodging. Mild attitude towards tax dodgers, permitting long-term tax arrears allows to decrease actual tax burden for some taxpayers. Non-cash budget execution tools (mutual offsets of budget and taxpayers' liabilities) can also reduce tax liabilities assumed by taxpayers to the State. Besides, intensive usage of these tools might be im-

portant for regional officials logrolling with taxpayers and budget funds recipients as well as with intermediaries practicing transfer pricing, which results in corresponding budget losses and gains of intermediaries and corrupted officials.

Budget execution form either bank or treasury is also of great significance. It is essential for a bank lobby that budget execution method secures an important client for he could gain a lot by operating the bank accounts of the latter. And it's significant for budget recipients that stricter control over budget funds expenditure be attained by treasury execution.

Budgetary outstanding credit debt accumulation mechanism as a mean of covering some budget expenditures allows to increase the amount of social services offered to the population (at least for a short period of time). But enterprises giving to the state a credit on goods and services provide against such policy.

Therefore, the institutional factors of budget policy, which exert an influence upon the efficiency of the latter, come to determine the level of the electorate support for the regional authorities owing to diverse regional groups' interest in this or that form of budget structure or budget execution. Consequently, it is necessary that regional institutional factors be regarded while choosing economic or social policy for the region.

Alongside with that the dynamic process of choosing the economic policy by the regional authorities can lead to structural changes in the groups supporting the authorities. From the point of view of both efficiency and effectiveness in budget social expenditures the development of target support institutions for the population groups in need comes to be of vital importance. Therefore, such development comes to be essential for the population interests but it can be provided against by enterprises offering public and transport services on the condition that service prices are subsidized by the state (under the categorial social subsidies system).

In the same way budget expenditure efficiency largely depends upon the reformation degree of some budget recipient sectors such as public health service, education, or culture, etc. But social institution reformation within a short period of time might stir up public opposition, especially if the institutions providing target support fail to satisfy all the requirements. Besides, budget recipient reformation arouses the employees' opposition.

On the one hand strict attitude revealed by the authorities towards tax debt enterprises stirs up counteractions initiated by the enterprises and their staff but on the other hand it allows increasing public goods provision level by budget income growth.

Causing corruption decrease and various intermediaries income diminution the reduction in non-cash budget execution forms deprives regional authoriries of the support provided by corresponding groups but allows of budget revenue increase and public goods supply.

The same situation occurs when provision of some public goods is financed through the accumulation of outstanding budgetary liabilities. Such tool allows of budget debts to enterprises offering services to the budget and public organizations as well as of budget debts to regional officials and public employees. The reduction in budget debts attained by cuts in financing of public health service, education and culture without any reforms carried out in order to increase expenditure efficiency results in diminution of public support for the regional authorities. But debt growth stirs up public employees' opposition as well as counteractions of the enterprises offering goods and services to the state and having natural monopoly over electricity, heating, and water supply to the state authorities and public organizations.

c) Fiscal policy and relations between the Federal Center and the regions. The state power represented by executive authorities and to a less extent by legislative authorities can exert a profound influence upon the level of public support for the regional authorities. It might be attained by a series of tools from a mere publicly declared support for a certain candidate for the Governor post at the coming elections up to the additional financial aid to the region by setting federal expenditure programs for the region, offering budget credits and granting extensions of credit repayment.

So as Federal center support could be available, the regional authorities should pursue their policy considering the Federal authorities' interests. The Federal Center interests can be divided into two groups. The first group comprises interests based upon regional political support for the Federal Center. These interests are not connected with economic policy pursued in the region and include, for example, voting in the Federal Council (The upper Chamber of the Russian Parliament) for a draft law lobbied by the federal executive authorities, launching a campaign for representing federal authorities' interests at parliamentary or president elections[4], or averting mass discontent with federal authorities manifested through protest against economic policy pursued, against public wage debts etc. The second group comprises the Federal Center interests in regional economic

[4] Corresponding activity of regional authorities can be characterized by the number of deputies elected in the region and constituting governmental fraction as well by the percentage of votes received by the President in the region during the elections, etc.

policy, inclusive of minimization of federal tax debts, the observance of legislation requirements (such as securing the inter-regional unlimited mobility of goods, the development of housing reform, absence of consumer price subsidies, etc.) and federal budget legislation requirements (such as execution of budget deficit value restrictions as well as the restrictions in budget debt imposed on federation subject, extra-budgetary funds absence, non-cash budget execution forms rejection).

It must be assumed that some regional leaders do not rely upon the Federal Center support and approval. If a leader takes priority over his rivals manifested through public support, he can be quite independent in policy setting according to existing constitutional structure in Russia (exclusive of present political reform based on Federal power increase and regional power decrease). More than that, the leader's opposition to the Federal Center might encourage the regional electorate support growth. Consequently, the growing influence exerted upon the regional electorate can result in gaining independence of the Federal Center by the regional authorities and vice versa. Alongside with that the policy pursued by the Federal authorities in order to increase the support for the governor might lower both the electorate and the officials welfare as well as well-being of the special groups representatives.

The description of general model for the regional authorities' fiscal behavior

According to the assumptions mentioned above we can arrive at the conclusion that the regional leader's behavior is determined by a complicated system of interrelated factors being of vital importance to the regional policy. In this article we make an attempt at formal simplified presentation of the problem. It should be noted that our description is of a preliminary character and the model described will be developed in order to define the conditions and features shaping the model functions determinant for the regional leader's decisions on both budget funds expenditures and tax collection. But now it is necessary that we undertake a practical task of shaping the interbudgetary equalization mechanism, which could force the regional leader to intensify tax accumulation and budget expenditures on public goods provision on the basis of his powers. Within the framework of the model development our description will add to the general model for regional authorities' fiscal behavior. Therefore, besides a preliminary description of general model for the regional authorities' behavior, this section comprises a descrip-

tion of methods for setting practical model based on further made calculations and empirical analysis of corresponding hypotheses. The factors regarded in the abstract within a simplified model in order to outline its applicability area and forecasting opportunities could be exposed through the description of the general model for the regional authorities' behavior.

Assume the possibility of maintenance the regional leader's present position be raised along with growing satisfaction expressed by the groups mentioned above, whose interests are closely connected with the regional leader's interests. It means that we are aimed at defining the regional leader's utility function increasing in each of its arguments, which comprise objective function value of the electorate, special interests groups, regional and federal officials and the Federal Center. In order to simplify the problem it might be assumed that each group exerts a direct influence upon the leader's position and the leader's effect with the groups is also direct. Besides, it should be assumed that each utility function of the groups be independent from the other functions. In a word the regional leader maximizes the objective function as

$$W(V(\bullet), P(\bullet), S(\bullet), F(\bullet)) \quad (1)$$

Where $V(\bullet)$ – indirect utility function value of representative household (the choice in favor of representative but not median voter will be justified further);

$P(\bullet)$ – indirect utility function value of the special interests group (the choice of such form of objective function is commented below);

$S(\bullet)$ – indirect utility function value of the administration officials;

$F(\bullet)$ – a function value describing the Federal Center estimation of the regional leader's activity.

The variables, which are determinant for functions $V(\bullet)$, $P(\bullet)$, $S(\bullet)$, $F(\bullet)$, objective functions of the economic agents described above as well as tool variables chosen by the agents are given below.

It is assumed that function W is increasing in each of its arguments V, P, S, F.

Regional leader's budget constraint go as follows:

$$E + Z + B = T + Tr, \quad (2)$$

where E – regional budget expenditure for regional public goods provision;

T – own tax revenues (received from different kinds of taxes given below)

Z – payments for administration officials and bureaucrats;B – welfare payments amount (pensions, subsidies, students' grants and scholarships, budget officials' salary exclusive of the officials considered in function S argument, and monetary allowances)

Tr – federal financial aid received by the regions from the federal budget

It should be noted that usually in the intergovernmental grants analysis the utility function of an average regional citizen (either median voter or representative consumer) is considered as objective function[5]. In some simple cases (for example in the model described in the next section) the objective function can be substituted for by individual preferences within a model with median voter, whose preferences determine the level of public and private goods provision. But it is possible that some difficulties in selecting a median voter preferences within the model be caused by the expenditure structure, budget execution technique, special interest groups structure (inclusive of some regional officials) variables included in the model besides federal expenditure amount and private goods production level (taxation level).

There is nothing unusual that different groups' interests be considered in the regional leader's utility function. For example, E. Juravskaya[6] assumes the leader's (mayor's) objective function be dependent upon such variables as «the level of public goods provision», «the level of private business regulation by the authorities», and «budget revenue amount used by the leader for personal purposes», which reflect the interests of many more others than local electorate.

Now let's analyze indirect utility function $V(\bullet)$. Representative household utility function $U(\bullet)$ could better serve the purpose of formalizing the regional population interests rather than median voter utility function[7]. The problem of median voter utility function regarded as the main function determining regional leader's behavior is caused by difficulties in linear ordering of the alternatives assumed. Even in a very simplified model the electorate preferences might be determined not only by expenditure amount on public goods provision but also by total tax share paid by the voter, terms of pension and allowance payments (if he is entitled to receive those), or public salary payments. And if linear alternative ordering could be regarded as impossible then the very notion of median voter as well as any analogy might not exist.

Expenditures for public goods provision along with after tax wages and allowances could be considered as a variable responsible for alternatives but then the question, whether the preferences of all participants of the voting process will be single-humped relative to linear ordered alternatives, remains unsolved as the utility function with its argument calculated this way might not be quasiconcave.

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[5] see *Rubenfeld (1987)*

[6] see *Juravskaya (1998)*

[7] for the median voter theorem see *Black (1948)*

The question, whether the median voter in the region is an allowance and salary recipient, is still open and the answer to this question may depend upon the characteristic features of the region and vary in different periods of time. Generally speaking tax changes as well as budget grant changes may draw the median elector from one group to another[8].

Consequently, it is expedient that representative taxpayer be considered as the agent, whose preferences are considered while the regional leader determines his behavior. Moreover it is possible that the whole household comprising three generations be regarded as economic agent and it might be assumed that such «enlarged» household system in the region be homogeneous[9]:

$$V(\cdot) = V(\overline{w}, E, t^h) = \max_{c, L^s} U(c, L^s, E) \qquad (3)$$

where c – the amount of representative household public goods consumption;

L^s – household labor supply for private sector (it will be assumed that the number of public sector employees and their labor time be exogenously given and each «enlarged» household has similar number of workers);

E – budget expenditure for public goods provision;

t^h– vector of tax variables used in the model for the household budget constraint;

$\overline{w}$ – wages value which is determined by labor market or by other factors,

Budget constraint for household goes as follows:

$$c = wL^s + B - T^h$$

[8] See *Atkinson and Stiglitz (1980)*. The problems raised by shaping the regional authorities' behavior model on the basis of either median voter or representative consumer are also discussed in *Holtz-Eakin and Rose (1988)*

[9] Taxpayers homogeneity is usually postulated in the models describing equilibrium public goods provision in local jurisdictions. For instance, decentralization theorem presupposes homogeneity (see *Oates (1972)*). Basic model for theory of clubs by Buchanan later adapted for the description of equilibrium public goods provision and local community size also assumes homogeneity (see *Buchanan (1965)*, *Musgrave and Musgrave (1989)*). Homogeneity is also postulated in the simplest model describing Tiebout hypothesis and the latter may serve as a basis for such kind of homogeneity, when regional authorities decisions on the production of local public goods proves to be independent and population mobility proves to be high. (see: *Tiebout (1956)*). Alongside with that both Tiebout hypothesis and clubs model could explain the reasons for homogeneity if the given assumptions prove to be true.

$$L^s \le 1,$$
$$L^s \le L^d, \quad (4)$$

where

W –wages in the private sector;

L^d – aggregate labor demand of the firms;

B – the variable comprising the sum of budget allowances, pensions and public sector wages received by the family members;

T^h – total amount of taxes paid by representative household.

The fact that total tax amount is included in the budget constraint doesn't mean that the taxes should be considered lump-sum. It is possible that income tax and sales tax be included in the model as:

$$T_h = t_w w L^s + t_s c \quad (5)$$

Then budget constraint for the household will be as follows:

$$(1 + t_s)c = (1 - t_w)wL^s + B \quad (6)$$

where

w – after-tax private sector wages,

t_w – personal income tax rate,

t_s – effective rate of taxes levied on consumption (in particular – sales tax rate),

$t_h + (t_w, t_s)$ – vector of household tax variables.

Now let's return to function $P(\cdot)$ If it can be assumed that special group interests are limited by regional big business interests in the model, then this function will represent expected disposable income utility received by enterprise owners inclusive, generally speaking, of sheltered income regarding possibility of tax breach exposure. Besides, legal tax evasion could be possible and its degree may depend upon budget policy transparency. In a simplified case an assumption can be made that income tax return be correct, then disposable after-tax net income will manifest itself as function $P(\cdot)$ value. In order to simplify the model it's advisable a short-term period be considered and our assumption be derived from aggregate production function of the regional large business enterprise, which goes as follows:

$$y = f(L^d) \quad (7)$$

where L_d – enterprise labor demand.

Assume the competitive market, then prices would be considered exogeneously given. To simplify set the product price as unity.

In this case

$$P(\overline{w}, t^f) = \max_{L^d} \pi(L^d, w, T_f) = \max_{L^d}[f(L^d) - wL^d - FC - T_f] \quad (8)$$

where

t^f – vector of tax variables used for enterprise profit calculation,

T_f – aggregate tax liabilities of the firm (it may be not lump-sum as in the household case)

FC – enterprise fixed costs.

If regional labor market competition is imperfect, w might be considered as function of L. Besides, as it was mentioned above, it is not obligatory that the market determine wage value. Within a more complicated task performed, it is possible to regard unemployment level value $\frac{L^s - L^d}{L^s}$ as a function variable estimating the Federal Center attitude towards the policy pursued by the regional authorities. But in the preliminary analysis of the model of interbudgetary transfers influence upon the regional authorities' decisions $P(\cdot)$ function will be omitted and only household utility for creating labor demand and wages level will be analyzed under assumption of exogenously given values of labor demand and wages.

It is also possible that the model get more complicated by regarding production function to be dependent upon public goods provision level.

$S(\cdot)$ can be considered as bureaucrats utility function depending on public goods production level and/or special groups income. Its value might be determined by a possibility that the officials will take discretionary decisions[10]. In the introduction it was mentioned which factors may exert an influence upon function value defining the Federal Center estimation given to the regional leader performance. But at present stage of model analysis this influence won't be regarded.

Therefore, the system describing regional leader's behavior comprises regional leader's objective function (1). The variables of this function are based upon objective functions of the groups, whose interests must be considered by a regional leader striving for power maintenance or growth, i.e. functions (3), (7) and $S(\cdot)$, $F(\cdot)$ functions, which were not detailed at the formal level, as well as budget constraints described in equations (2) and (5). In the preliminary analysis

[10] Generally speaking, bureaucrats' interests are largely determined by influence degree they could exert, by resource amount they could control as well as by public control. According to Niskanen model (see *Niskanen (1971)*, *Chernick (1979)*) officials tend to aspire for public expenditure level exceeding optimal level.

the Federal Center influence won't be regarded exclusive of federal authorities influence exerted upon transfers amount received by the region.

Therefore, regional authorities' objective function will be regarded as follows:

$$W(V(\cdot), P(\cdot), S(\cdot)) \quad (9)$$

Besides, in the simplified model it will be assumed that *S* entirely depends upon *Z*, i.e. upon the sum expended on officials' interests, the amount of which is defined by the regional leader. Consequently, regional leader's objective function goes as follows:

$$W(V(\cdot), P(\cdot), S(Z)) \quad (10)$$

As long as even after such simplifications the model tends to be rather complicated, it is necessary that a series of further simplifications be performed in order to determine the influence exerted by intergovernmental grants allocation methods upon regional leader's behavior.

Now the situation when the regional leader can change only tax revenues collected in the region and received by the regional or local budget as well as expenditures on public goods provision value will be analyzed. Both wages level and labor demand are exogenously given (the latter is considered by households as exogenous for it is defined on the basis of enterprise profit maximization) as well as pecuniary reward value of the regional government officials is also exogenously defined.

In this case *Z* and, consequently, *S (Z)*, as well as *B* prove to be constants and for that reason the will be regarded in neither utility function nor budget restriction[11]. Then the leader maximizes the following function:

$$W(V(\cdot), P(\cdot)) \quad (11)$$

subject to $E = T + Tr$, (12)

where $T = T^f + T^h$

Then

$$V(\cdot) = V(\overline{w}, E, t^h) = \max_{c, L^s} U(c, L^s, E) \quad (13)$$

subject to $c = wL^s - T^h$

$$L^s = L^d \quad (14)$$

[11] Utility function will change without any loss inflicted on its features manifesting typical preferences. Therefore it is possible that in the function *E* be substituted for by public goods provision level *Q=E+const,* where the constant may be either positive or negative but in any case exogenously given.

If it is assumed that enterprise taxation level is not varied by the regional leader[12], then

$$P(\cdot) = P(\overline{w}) = \max_{L^d} \pi(L^d, w) = \max_{L^d}[f(L^d) - wL^d - FC] \quad (15)$$

In this case if T^f as well as other constants is not considered in regional leader's budget constraint, then $T = T^h$.

Labor demand is uniquely determined by exogenously given wages and profit which follows from the maximization condition. If it is assumed that there is no labor deficit, then it is possible to define household labor amount, i.e.

$$P(\cdot) = P(\overline{w}) = \max_{L^d} \pi(L^d, w) = \max_{L^d}[f(L^d) - wL^d - FC] \quad (16)$$

P (·) value can also be uniquely defined and region leader's final objective function will comprise it as a constant.

Then, as long as household labor amount and wages are sharply defined, it is necessary that a new notation be introduced

$$I = wL = wL^d \quad (17)$$

Then household budget constraint goes as follows:

$$c = I - T^h = I - T \quad (18)$$

If *c* is substituted in the household utility function (regarding *L* as uniquely determined), we get $U(I - T, \overline{L}, E)$.

If it is assumed that household system be homogeneous, regional leader's utility function comes to be as follows:

$$W(U(I - T, \overline{L}, E), \overline{P}) \quad (19)$$

where $T = T^h$;

$\overline{P}$ – fixed value of after-tax (disposable) income received by enterprise owners.

The task can also be formulated as maximization of some regional leader's utility function *U (E,T)*, subject to the condition of *E = T + Tr*.

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[12] It can be assumed that taxes on enterprises are varied then labor demand will depend upon the taxes and, thus, enterprise tax value will be included into the utility function of the electorate all the same. But at this stage we are not interested in the analysis tax burden distribution between labor and capital, therefore, it will be easier to neglect taxes on enterprises.

The analysis of a simplified model of regional fiscal behavior under regional authorities‘ utility function of Cobb-Douglas type

In order to define the influence exerted by the basic features of intergovernmental transfers system upon regional fiscal policy a simplified variant of one of the model types described above should be analyzed. It might be assumed that objective function be dependent only upon two variables: regional consolidated budget expenditure amount (positively) and tax revenues received by the regional budget (negatively) both determined by selected level of regional and local tax rates as well as by shared federal tax revenues received by the regional and local budget:

$$U\left(E^{(+)}, T^{(-)}\right) \to \max_{E,T} \tag{20}$$

where E – the RF Subject consolidated budget expenditures (as an indicator reflecting level of public goods provision in the region),

T – tax revenues of the RF Subject consolidated budget (regional and local tax revenues as well as revenues from federal shared taxes received by regional and local budgets)[13].

Regarding utility function as mentioned above, we can assume that public transfers (cash or in-kind) are not included into regional budget expenditures and budget revenues are based on tax payments leading to reduction in public goods consumption experienced by economic agents other than the state. According to this assumption the formula can be regarded as a problem similar to the classical problem household choice between public and private goods consumtion often mentioned in economic literature[14]. For example, *Williams* assumed[15] that local communities possess indifference curves of choice between private and public goods similar to individual indifference curves. The formula (20) can be shaped as follows:

$$U\left(E^{(+)}, (Y-T)^{(+)}\right) \to \max_{E,T} \tag{21}$$

[13] As it was mentioned above, regional authorities' utility depends upon regional tax burden value, i.e. tax incidence imposed upon regional product, rather than total budget revenues amount (the latter influences utility function through budget expenditure amount)

[14] See, e.g. Samuelson (1954)

[15] See Williams (1966)

where Y – regional disposable income.

Such formula makes it possible to consider that tax growth leads to reduction in disposable income as well as in private goods consumption. This type of objective function will be analyzed below[16]. As it was demonstrated above, the equation (20) results from more general assumptions about regional authorities behavior, therefore, the choice between regional budget revenues and expenditures will be regarded as some general model comprising different groups taking an interest in it. However the conclusions we arrive at below prove to be true for a simple model describing consumer's choice based on transfer formula of a certain type.

The regional authorities maximize utility function (20) or (21) along with budget constraint (22) consisting in the assumption that expenditures can't exceed the sum of revenue amount and the amount of federal transfer received:

$$E \le T+Tr \qquad (22)$$

And the transfer from the federal budget is calculated by the federal fiscal authorities in proportion of y to the gap between regional budget revenues and expenditures. According to the coefficient α value the gap range between revenue and expenditure side is based upon either actual (reported) expenditure amount or regional expenditure needs. It is in the same manner that coefficient β value determines the weight of actual budget revenues or revenue capacity in calculating the revenue item in the regional expenditures less revenues gap calculation.

$$Tr = \gamma\left\{\left[\alpha E + \left(1-\alpha\widehat{E}\right)\right] - \left[\beta T + \left(1-\beta\right)\cdot\widehat{T}\right]\right\}^{17} \qquad (23)$$

where Tr – financial aid value received by the region from the federal budget (FFAR transfers, subventions, state subsidies, mutual settlements, etc.)

T – regional tax revenues (regional, local as well as federal tax revenues received by regional budget). In order to simplify the calculation it might be assumed that lump-sum taxes are used;

E – regional budget expenditures;

$\widehat{T}$ – regional fiscal capacity calculated according to собственным tax income.

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[16] It should be noted that utility function definition like $U(E,T)=lnE+a\cdot ln(T)$ leads to technical difficulties, if T value is minimal.

[17] A more general financial aid formula based upon actual income, expenditure, and standards and possessing a larger number of independent coefficients could be analyzed as well. But regarding the given financial aid model, formula (23) will serve as the basis for further calculations.

$\widehat{E}$ – regional expenditure needs standards (some 'normative' expenditures calculated by the federal fiscal authorities concerning estimates of regional expenditure needs and federal priorities in regional development).

In the countries with multi-leveled budgetary system it is formally declared that intergovernmental equalization programs implemented are aimed at equalizing the ability of sub-national governments to provide public goods. Those programs if looked at from the economist point of view are based on the estimates of subnational jurisdictions' fiscal capacity and/or their expenditure needs. But in practice interbudgetary equalization mechanisms (inclusive of FFAR allocation methodology used in Russia at the present moment) are aimed at filling (at a certain ratio) the gap between regional revenues and expenditures rather than at equalizing the potential level of public services provision. Besides, both fiscal capacity and expenditure needs estimates are based (to some extent) on actual revenues and expenditures figures.

This fact makes it possible to devise financial aid allocation formula as (23). Coefficients α and β value in regard to some particular equalization program can be interpreted as the degree of actual budget execution data influence exerted upon regional fiscal capacity and expenditure needs calculation. As well as coefficient γ value shows intergovernmental financial aid influence exerted upon recipients' gap between certain estimates of budget expenditures and revenues.

Conformably to Russia it means that at present actual function of equalization transfers received by the regions from the federal fund for financial assistance to regions doesn't consist in regional minimum level of public goods provision equalization in terms of public goods provision or budget revenues but in filling up the gap between expenditures set by legislation and potential (calculated according to the Federal Center data) budget revenues. In practice expenditure responsibilities and potential revenue calculation to more or less extent (in different years)[18] depended upon both actual revenues along with expenditure value and expenditure needs as well as fiscal capacity estimates. If other kinds of federal financial aid could be considered in addition to FFAR transfers, then it would be possible to state that actual budget revenues of Federal subject and ex-

[18] The formula of transfer calculations being shaped year after year (from 1994 to 2001), there was a gradual transition from actual income and expenditure values to standard ('normative') expenditure needs and tax capacity values. The transition was aimed at creating both incentives to increase tax efforts of the regional authorities and incentives to reduce budget expenditures and improve the efficiency of the latter.

penditures regarded within financial aid allocation methodology be more important than tax capacity and expenditure needs values[19].

It is well known that income effect caused by federal general lump-sum to the region results in tax decrease and expenditure growth[20]. Accordingly, if the transfer is aimed at public goods supply increase, then private goods consumption incentives (i.e. incentives to regional tax burden relief resulted from the grant) could be considered as negative. Consequently, financial aid allocation strategy should be devised so as the incentives to tax cuts could be minimized but positive incentives to public goods provision increase (the increasing expenditures for public goods provision) could be maximized. The model analyzed in this section makes it possible to distinguish cases of diverse changes in regional budget revenues and expenditure value selected by the regional authorities, which are determined by changes in financial aid amount received within the range of transfer calculation methodology. Empirical analysis made below gives us a chance to define in practice incentive intensity as well as its dependence upon the factors of financial aid calculation structure.

At the same time it should be noted that definition of financial aid effect produced upon regional budget revenues and expenditure as positive or negative depends on the interbudgetary equalization goal pursued by federal authorities. It is obvious that reductions in tax collection resulted from financial aid can be regarded as negative effect if federal authorities' policy is aimed at equalization of regional potentials concerning public goods provision. But if interbudgetary transfers are aimed at regional welfare growth, then resulted from federal financial aid corresponding value changes in the selected by regional authorities tax revenues and budget expenditures can't be regarded as totally negative for the goal consisted in interregional welfare equalization will be achieved (by means of income effect). Alongside with that the amount of regional compensation for the gap between revenues and expenditure, i.e. transfer amount, can be defined only within the framework of a more general problem concerning all the regions and the center and determining the population welfare maximization in all the regions attained by allocation of limited resources established in order to support the regions.

[19] It should be also noted that in general case the part of the gap between revenues and expenditures covered by federal financial aid as well as the weight determinant for all the actual values may be different for different regions.

[20] See, e.g., *Wilde (1968)*

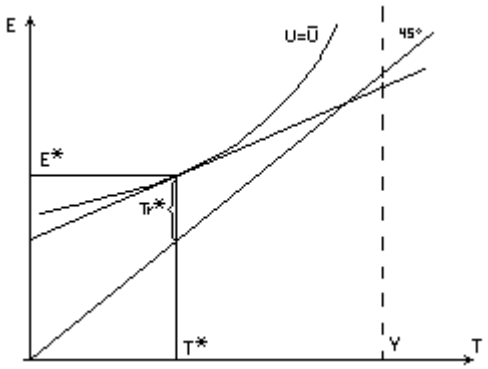
The federal financial aid being viewed as a part of aggregate interbudgetary financial flows, taking account of the federal tax revenue sharing between the regional and the federal budgets, there should be a negative coefficient item thus added up to the formula representing tax revenues of the federal budget collected on the region's territory. In this case for some regions, which can be defined as «federal budget donors», the transfer amount will be negative. It should be noted that negative transfer amount could also be observed within the set of regions defined as federal financial aid recipients (if federal financial aid amount received is less than total tax revenues collected in the region and accrued to the federal budget)[21].

But such model modification won't be considered below. According to interbudgetary equalization procedure transfer value received by the region in model (21)–(23) can be either positive or negative. Up to 1994 value-added tax revenue received by the regional budget and specified for each federal subject in individual manner was regarded as negative transfer if value added tax amount in a region was less than country average. But at present negative transfers do not exist in Russia. Therefore, in order to avoid additional restrictions in further calculations (if transfer value calculated in the given formula is negative, the transfer equals zero) we will make a general analysis but pay close attention to the regions receiving positive transfer (in Fig. **Ошибка! Источник ссылки не найден.** corresponding points are placed above 45˚line).

In the model it is premised that budget constraint (22) be performed as equality. Indeed, any transfer is positively determined by actual regional budget expenditure as long as it is determined negatively by actual budget revenues. And consequently, the constraint being performed as inequality, it is possible that expenditure be increased (tax revenue be reduced) and utility value of regional authorities be raised. Therefore, budget constraint will be regarded as equality constraint in further calculations. Picture **Ошибка! Источник ссылки не найден.** provides graphic illustration of positive transfer received by the region.

[21] The correlation between revenues and expenditure at different levels of budget structure is analyzed in more detail by *S. Dneprovskaya, S. Sinelnikov, I. Trounin, S. Chetverikov (2001)*

FIGURE 1



In order to get a more detailed result than the one possible in the general model analysis it is advisable that regional authority utility function of Cobb-Douglas type be mentioned. The regional authorities define the value of private and public goods consumption. Public goods consumption is characterized by regional budget expenditure value and private goods consumption is determined by regional tax and income value. Alongside with that income value can be regarded as exogenously given factor of utility function specification.

Therefore, utility function variant suggested goes as follows:

$$U(E, T) = \ln E + \alpha \ln (\Psi - T) \quad (24)$$

Utility function maximization can be performed under two conditions:

Budget constraint

$$E = T + Tr \quad (25)$$

Transfer allocation methodology

$$T\rho = \gamma \cdot \{[\alpha \cdot E + (1-\alpha)\, \widehat{E}\,] - [\beta \cdot T + (1-\beta) \cdot \widehat{T}\,]\} \quad (26)$$

where most variables are analogous to the ones given in the previous section:

E – regional budget expenditures;

T – regional budget revenues;

Tr – federal center financial aid (transfer) to the region;

$\widehat{E}$ – expenditure standards (exogenously given and correspondent to objective needs of a region in budget expenditures)

$\widehat{T}$ – regional fiscal capacity (exogenously given and correspondent to objective tax collections level, e.g. within average tax efforts);

Y – before tax revenue of regional economic agents;

α, β, γ – model parameters (α – characterizes the degree of actual expenditure influence exerted upon financial aid allocation strategy in comparison to theoretical value, β – the degree of financial aid allocation being determined by actual tax revenues, γ – covered part of the gap between regional budget revenues and expenditures regarded as standard (or 'normative) and actual revenues or expenditure value defined by α and β)

It should be noted that relations between taxation level and regional economic agents' income, which could be performed as additional constraint like T=θY on the account of the assumption that taxes dependent upon regional authorities' choice prove to be lump-sum, has not been considered here.

In order to simplify the model we can transform the constraints substituting one for another and grouping their items with E and T. As a result we'll get the only constraint for utility maximization problem:

$$E\cdot(1-\gamma\alpha) - T(1-\gamma\beta) = \gamma A \qquad (27)$$

where

$$A = (1-\alpha)\widehat{E} - (1-\beta)\cdot\widehat{T}\ . \qquad (28)$$

The equation (28) multiplied by parameter γ can be regarded as objective part of the financial aid to the region, i.e. the parts determined by exogenous regional features such as expenditure needs standards and tax capactiy but independent from their actual value. In a word, this part of transfer to region is defined by fiscal capacity and expenditure needs estimates adjusted according to coefficients $(1-\beta)$ and $(1-\alpha)$, the latter two characterizing the degree of transfer allocation methodology orientation to objective regional features. Then quantity $Tr - \gamma A = \gamma(\alpha E - \beta T)$ proves to be the part of the transfer assigned according to actual regional revenue and expenditure values, corrected by weights α and β.

First order conditions (necessary and sufficient when it is required that authorities' preferences and respective indifference curves be convex), after being transformed and Lagrange multiplier being excluded, lead to the following optimum condition for this simplified model: relation between marginal rate of substitution of expenditure increase for tax burden relief:

$$MRS_{ET} = -\frac{U_E}{U_T} = \frac{1-\alpha\gamma}{1-\beta\gamma} \qquad (29)$$

Thus marginal rate of substitution of change in expenditures for tax burden change depends upon the rules applied to transfers allocation. Some following

particular cases of financial aid allocation parameters can serve as an example to the assumption.

Let γ=0. Actually it presupposes that there are no transfers within IGFR system. Then optimum choice of budget expenditure value and tax burden level made by the regional authorities will be characterized by MRS_{ET}=1, i.e. marginal utility of public expenditures in the optimal point must equal marginal loss inflicted by tax burden increase. This situation is characterized by lack of any incentives caused by transfers within regional authorities' fiscal behavior. Interbudgetary financial aid system (i.e. its absence) offers no incentives to expenditure growth or tax rate reduction on account of their compensation at the federal budget expense. Analogously, revenues growth does not result in corresponding financial aid amount decrease (as it is not available) and therefore, revenues growth attained by tax rate increase or (and) tax base growth proves to be stimulated. The regions deprived of federal financial aid experience the same when $\gamma \neq 0$.

If γ is bigger than zero but less than unity, then the share of the gap between calculated regional expenditures and revenues equal to γ, is covered by the transfer. Now some particular cases can be considered: $\alpha=0$ and $\beta=0$; $\alpha>0$ and $\beta=0$; $\alpha=0$ and $\beta>0$.

If both weights α and β equal zero, then while calculating the gap between revenues and expenditure the transfer allocation methodology will be focused on expenditure and revenues 'normative' or 'potential' values independent from regional authorities' behavior like in γ=0 case (the transfer is defined by expenditure and revenues 'normative' value). Therefore, the system will lack incentives to expenditure growth and tax reduction on account of bigger transfer amount but will create incentives to own revenues growth and expenditures cutting in order to balance the budget. In this case marginal rate of substitution of taxes for expenditure MRS_{ET} equals unity, i.e. public expenditure increase essential to the compensation for tax burden growth equals the latter (tangent slope to objective function level line in the optimal point equals minus unity).

It should be noted that analogous situation might occur if any α, β values equal each other[22]. Thus, if 'normative' and actual values of tax revenues and budget expenditure are regarded according to the symmetrical rules applied in

[22] It should be mentioned that the point is not that transfer growth results in regional expenditure increase and tax reduction but that within given symmetrical transfer model the region has no incentives to manipulate actual revenues and expenditure value in order to gain the increase in the transfer.

order to calculate the gap between the latter, regional authorities' marginal utility of expenditure increase equals in the optimum point marginal loss inflicted by tax burden growth. The reason for it is that, α and β being equal, the slope of budget constraint is 45º as well as transfer amount with any E and T values lying on the boundary of the tolerance range is determined by $\gamma(1-\alpha)(\widehat{E}-\widehat{T})/1-\gamma\alpha$ independent from actual E and T values. The case when $\gamma=1$, $\alpha=1$ and $\beta=1$ makes an exception to the rule. It consists in total covering the gap between actual public revenues and expenditures in the region, i.e. in absence of budget constraint.

Transfer value defined only by federal 'normative' revenues and expenditure for the region, which performs a particular case of symmetrical (in the sense mentioned above) transfers allocation model, draws our interest as long as regional authorities lack incentives to modify fiscal behavior in order to change financial aid amount for actual regional decisions exert no influence upon transfer value (in short-term period). Within symmetrical model transfer value modification causes fiscal incentives resulted from income effect, which lead to actual tax revenue decrease and actual expenditure growth in the region.

If financial aid model is not symmetrical, then transfer value modification results not only in parallel shift of budget constraint line but in its slope change as well, i.e. it causes both income effect and substitution effect. Regional authorities' fiscal incentives caused by income effect prove to be similar to the previous case. Besides, within the model described, optimum tax and expenditure values selection exerts an influence upon the transfer amount, i.e. being determined by substitution effect the choice of revenue and expenditure levels is exercised considering their influence exerted upon transfer amount. The transfer made according to asymmetrical methodology based on 'normative' or actual revenues and expenditures produces an effect similar either to change in relative prices in a simplified model of consumer's choice or to matching grant in the model of regional authority choice namely – to modifying price of public goods. Asymmetrical transfer calculation methodology results in influence exerted by transfers upon relative prices for private and public goods attained by matching of budget expenditures (public goods price) and participation in regional budget revenues formation (private goods price).

If parameter α is greater than zero and β=0, then revenue and expenditure policy pursued by the regional authorities loses its symmetry and proves to be independent (as in the previous case) from objective function features. If β=0, the transfer while being calculated is based upon fiscal capacity amount rather than actual revenues amount. Alongside with that parameter α value determines the

degree of 'normative' or actual expenditure presence in the transfers allocation mechanism.

Thus, the region has neither incentive to reduce taxes expecting transfer increase nor anti-incentives to foster own revenues growth for fear of transfer amount reduction. At the same time if α and γ values are big enough, then along with expenditure growth objective function value proves to be increasing without adequate tax growth reducing corresponding utility value for budget restriction comes soften on account of transfer value increase. It is in the same manner that expenditure reduction should lead to transfer decrease, which must be compensated by regional tax growth. Thus, choosing budget expenditures and tax values regional authorities gain incentives to regional expenditure increase on account of federal compensation for the gap between regional revenues and expenditure. As a result, optimum decision of the regional authorities could be characterized by the following relation between tax and expenditure marginal utilities:

$$U_E = U_T (1 - \alpha\gamma) \qquad (30)$$

It means that in the optimum point marginal utility of expenditure growth is $\frac{1}{1 - \alpha\gamma}$ times lower than marginal loss inflicted by tax burden increase. Given the assumed objective function convexity properties, the optimum will be achieved under high expenditures level andhigh own taxes level. In other words tax burden reduction compensating for regional expenditure decrease should be $\frac{1}{1 - \alpha\gamma}$ times less than the latter.

On the contrary, when coefficient β is positive and coefficient $\alpha = 0$, the transfers allocation mechanism is orientated to 'normative' expenditures amount and, if both β and γ values are big enough, to actual regional own revenues. Consequently tax reduction results in utility gain caused by tax burden decrease and absence of adequate utility loss attained by a less expenditure reduction on account of transfer growth, the latter partially compensating for regional public revenues decrease. It is in the same manner that expenditure growth by the amount less than corresponding regional revenues increase be caused by tax growth for alongside with that the transfer amount is decreasing. Thus, $U_E (1 - \beta\gamma) = U_T$, i.e. marginal utility of regional expenditures in the optimum point $\frac{1}{1 - \beta\gamma}$ times exceeds marginal loss inflicted by tax growth. It means that in order to compensate for utility decrease during expenditure reduction it is necessary

that taxes be $\frac{1}{1 - \beta\gamma}$ times reduced. In this case, if the utility function has the assumed properties, the optimum will be achieved in low expenditure value and tax value point.

Solving the problem of utility maximization (21) within constraints (22) and (2323) we'll get the following equations for optimum E^* and T^* dependent upon problem factors as well as for μ that is Lagrange multiplier within constraint (27):

$$E^* = \frac{1-\gamma\beta}{1-\gamma\alpha} \cdot \frac{Y}{a+1} + \frac{\gamma}{1-\gamma\alpha} \cdot \frac{A}{a+1} \quad (31)$$

$$T^* = \frac{Y}{a+1} - \frac{\gamma}{1-\gamma\beta} \cdot \frac{aA}{a+1} \quad (32)$$

$$\mu = \frac{a+1}{Y(1-\gamma\beta)+\gamma A} \quad (33)$$

Thus, regional authorities' optimum choice depends upon the rules applied to regional transfer allocation. Further on analyzing equations (31) – (32) we'll arrive at a number of conclusions regarding the influence of IGFR structure exerted upon regional authorities' fiscal behavior performed by the choice of this or that tax burden and budget expenditure level.

From equations (31) – (32) it can be concluded that optimum value of regional budget expenditure and tax amount are positively dependent upon *Y*. Alongside with that corresponding private derivative for T^* is determined by the α value and is independent from transfer allocation structure, i.e. the higher α weight within objective function is assigned to private goods the less tax growth can be observed along with income increase. At the same time partial derivative E^* with respect to *Y* also depends upon correlation between a and b. It means that along with Y growth optimum expenditure value is increasing according to ratio of α to β, and to be more exact according to marginal rate of substitution of expenditures for taxes in the optimum point: MRS_{ET}. The greater the marginal rate of substitution is, the more regional public expenditures increase along with *Y* growth.

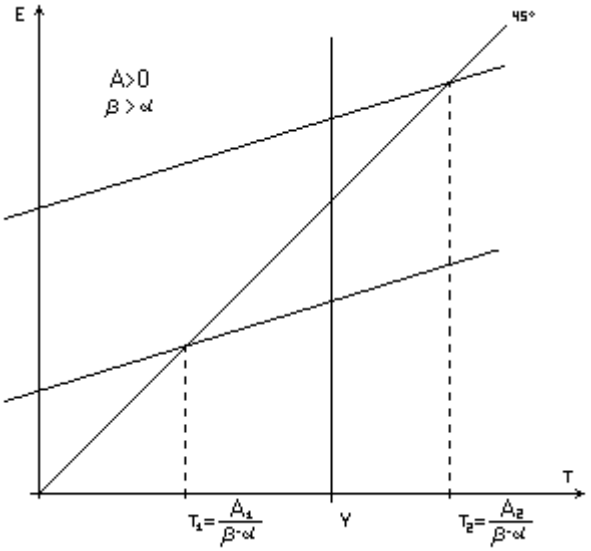
Now, let us analyze, how the modification of different factors constituting the model and determining the transfers allocation mechanism exerts its influence upon regional authorities' optimal choice. Changes in the *Y* value lead to proportional changes in transfer amount. If transfer allocation methodology is not determined by regional budget actual expenditures and tax revenues, the effect pro-

duced by changes in γ proves to be similar to the changes in lump-sum grant effect in the simplified model of choice between public and private goods, which leads to growth of public goods provision along with tax decrease (expenditure and tax value modification is dependent upon only income effect, see Fig. **Ошибка! Источник ссылки не найден.**). In general within analyzed model the transfer amount is determined by the choice of regional authorities between budget revenues and expenditures, which after γ modification, besides income effect can cause a shift along indifference curve with simultaneous tax revenue and expenditure change made by regional authorities and attained by additional influence exerted by substitution effect. Therefore, it is not always possible that the sign of expected tax revenue and expenditure change be precisely determined.

Analyzing partial derivatives of optimum tax revenue and expenditure value it should be noted that four most common situations characterized by the parameters' values described below could be pointed out. These situations are defined by A and $(\alpha-\beta)$

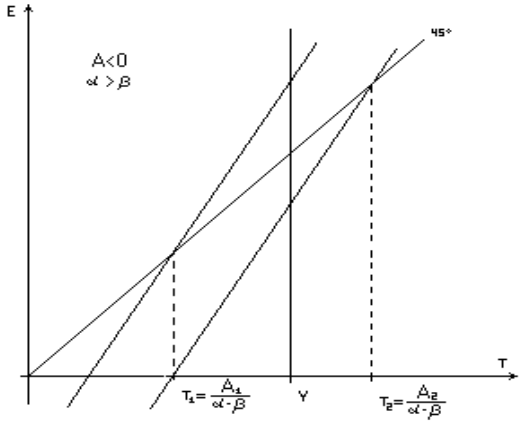
1. $A>0$, $\beta>\alpha$.

FIGURE 2



2. $A<0$, $\alpha>\beta$.

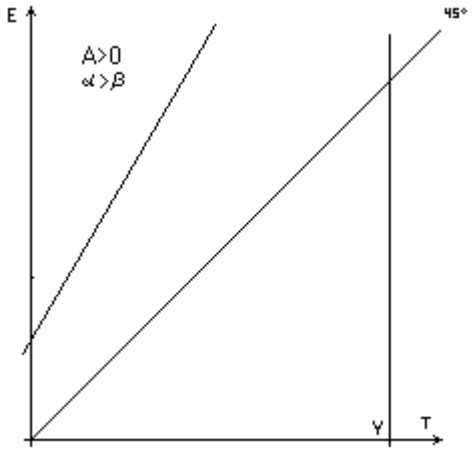
FIGURE 3



Besides, as it is shown in the figures, each of the two situations can be additionally characterized by the intersection point position of budget constraint and bisector relative to asymptote position.

3. $A>0$, $\alpha>\beta$. Under such parameters' relationship the region always proves to be financial aid recipient.

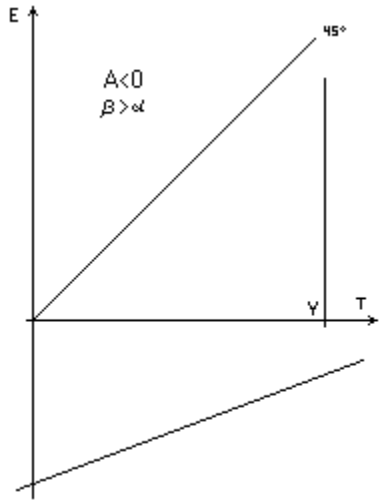
FIGURE 4



4. $A<0$, $\beta>\alpha$.

Within such relationship of parameters the region always proves to be a donor, i.e. the financial aid amount received is always negative.

FIGURE 5



Partial derivatives of optimum expenditure and tax value with respect to parameter γ go as follows:

$$\frac{\partial T^*}{\partial \gamma} = \frac{-aA}{(a+1)(1-\gamma\beta)^2} \qquad (34)$$

$$\frac{\partial E^*}{\partial \gamma} = \frac{A+(\alpha-\beta)Y}{(a+1)(1-\gamma\alpha)^2} \qquad (35)$$

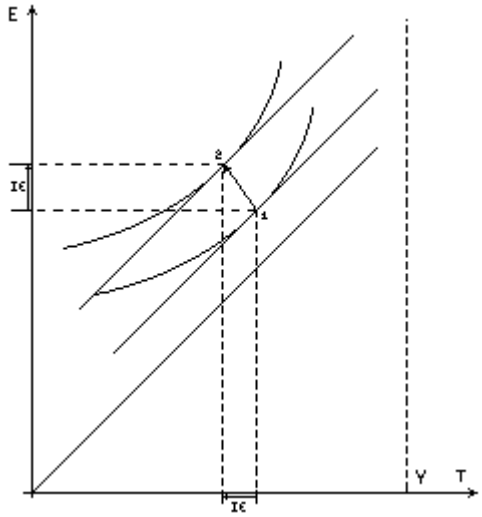
Three different situations, which perform various results consequent on the change in transfer amount compensating for the gap between regional public revenues and expenditures, prove to be possible $\alpha=\beta$, $\alpha>\beta$, $\alpha<\beta$. And as it was mentioned above, the situations additionally differ from each other depending on the *A* parameter sign f ($A = (1-\alpha)\widehat{E} - (1-\beta)\widehat{T}$)[23] and on following the condition

[23] As it will be demonstrated below, estimates given to Russia for the period of 1997-1999 prove A value to be positive.

of relationship between regional revenues amount and absolute value of A: $Y<|A|/(\alpha-\beta)$.

If $\alpha=\beta$ (inclusive of $\alpha=\beta=0$ case), the region always proves to be a transferee under the condition that the part of the transfer calculated on the basis of objective factors within given values of α and β exceeds zero. ($A > 0$ or $\gamma A > 0$) In this case transfer amount growth leads to the change in the regional authorities' choice of optimum taxation level and budget expenditure amount determined only by income effect (see Fig.**Ошибка! Источник ссылки не найден.**)

FIGURE 6



Judging by Fig. **Ошибка! Источник ссылки не найден.** we can assume that while changing its position from point 1 to point 2 budget constraint of the regional authorities is shifted to the north-west by the value of the budget constraint intercept change the latter being equal the change in transfer value:: $\Delta(\frac{\gamma A}{1-\gamma\alpha})=\frac{A}{(1-\gamma\alpha)^2}\cdot\Delta\gamma$. The shift proves to be parallel to its initial position (for budget constraint slope still equals 45°, if $\alpha=\beta$) Thus, even if regional decisions on tax revenue and budget expenditures levels exert an influence upon transfer value calculation (α and β do not equal zero), but rules of revenues and expenditures 'normative' values in transfers calculation prove to be symmetrical as long as transfer grows (consequent on value γ increase), the region lacks incentives to

disproportional substitution of taxation level for budget expenditures (MRS_{ET}=1). It is determined by the fact that for each tax and expenditure value in budget constraint (i.e. the points that can be selected within assumed regional authorities objective function) transfer value remains the same and does not depend upon particular *E* and *T* value.

Thus, the model illustrates a well-known fact that when lump-sum (block) grant is received by the region, regional budget expenditures influenced by income effect comes to increase for a value less than the grant amount as well as tax burden level determined by income effect tends to decrease.

It is assumed that when $A<0$ and $\alpha=\beta$ the regions with negative transfer amount be considered. These are the regions characterized by fiscal capacity exceeding 'normative' expenditures taken with corresponding equal weights. In this case parameter γ growth (if $\alpha=\beta$) causes negative income effect. Alongside with that budget constraint is shifted downwards, which results in tax increase and expenditure reduction.

The assumptions made are not dependent (if $\alpha=\beta$) upon a particular type of regional authorities' objective function. In the regarded case partial derivative of optimum tax value with respect to γ maintains its shape (34). Thus, it is in the same manner with general case that taxes be decreased along with transfer growth (if $A>0$), but if $A<0$ within donor region be increased. The derivative for optimum expenditure value with respect to γ looks as follows:

$$\frac{\partial E^*}{\partial \gamma} = \frac{A}{(a+1)(1-\gamma\alpha)^2} \qquad (36)$$

Thus, partial derivative value is totally determined by the sign of the *A*. If expenditure 'normatives' exceed regional fiscal capacity, growth if γ results in optimum expenditure increase (and tax revenue reduction), causing the shift from expenditure financing attained by tax revenue to the financing at the account of the grant. I.e. if $A>0$, regional public expenditures always proves to be growing on account of income effect while transfer is increasing. If $A<0$, expenditures prove to be reduced while negative transfer growth.

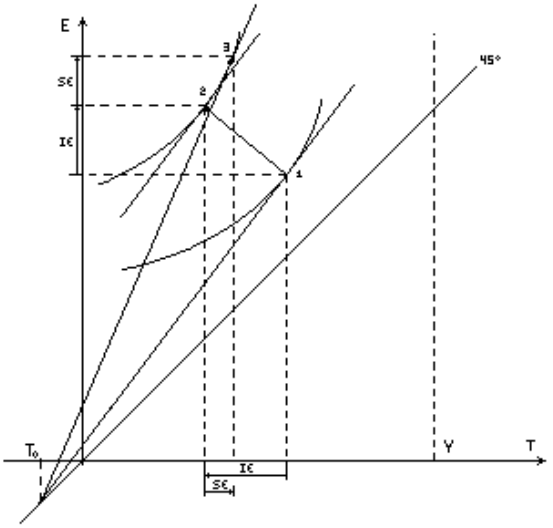
If $\alpha\neq\beta$, i.e. transfer rules are not symmetrical with regard to weights of revenues and expenditure 'normative' values, then along with γ growth the change in optimum regional tax revenues and budget expenditures is determined by both income effect and substitution effect.

If $\alpha\neq\beta$ within the γ growth, the substitution effect is formally caused by budget constraint turn around point $T_0=\frac{A}{\beta-\alpha}$ (characterized by zero transfer val-

ue), which leads both to intercept and slope of the budget constraint $E=\gamma\frac{A}{(1-\gamma\alpha)}$ $+\frac{(1-\gamma\beta)}{(1-\gamma\alpha)}\cdot T$ change.

2. Let's analyze the situation, when $\alpha>\beta$. Such relationship between α and β means that transfers calculation methodology is orientated to actual expenditure rather than to actual taxes compared to their 'normative' values. Within such α and β values, if A>0, the region always proves to be the transferee. In this case (see picture **Ошибка! Источник ссылки не найден.**), if γ value grows in point 1, then after being shifted to point 2 as well as after budget constraint turn optimum decision is achieved in point 3. It is possible that corresponding expenditure and tax changes be decomposed into changes gained by income effect and those attained by substitution effect.

FIGURE 7



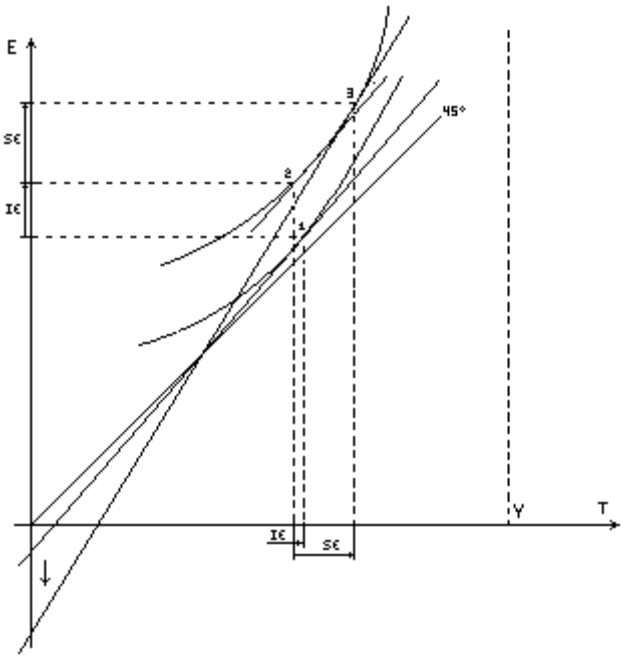
It is obvious that expenditure growth and tax reduction (parallel shift of budget constraint to point 2) be determined by income effect. But unlike the previous case characterized by α and β equality, transfer value increase also leads to budget constraint turn. It means that while applying the rules of transfer calculation based upon actual expenditure rather than upon actual taxes ($\alpha>\beta$), the region might add to expenditure value in order to gain the increase in transfer value

(so as the transfer amount would be increased). Alongside with that it proves to be necessary that taxes be increased in order to balance the budget (i.e. γ doesn't equal unity and the transfer is received regardless both expenditure needs 'normative' value and fiscal capacity). The process of budget constraint turn along the level line of regional authorities' utility function lasts unless the following relationship between marginal utility of expenditure growth and marginal loss inflicted by tax increase is achieved:

$$\frac{U_E}{U_T} = \frac{1-\alpha\gamma}{1-\beta\gamma} \qquad (37)$$

Income effect always proves to be positive for budget expenditures and always negative for tax revenues. Substitution effect is always positive for expenditures and as for taxes substitution effect depends upon the change in the budget constraint slope. Rapid growth of angle coefficient facilitated by an excess of α value over β, i.e. by orientation to actual public expenditures rather than actual taxes, comes to determine positive substitution effect for taxes, otherwise the latter is negative. Therefore, transfer value growth may result in either chosen regional tax revenue increase or decrease.

FIGURE 8



If $A>0$ (the region always proves to be financial aid recipient) in the model modification under consideration, characterized by partial derivatives of optimum tax and expenditures values (34) – (35), tax value is always decreasing along with γ value growth (that is with transfer growth) for corresponding derivative is negative. If $A<0$ the derivative of optimum tax value **with respect to** γ is always positive. As a result regional authorities' tax revenue increase is consequent on y growth (if $\alpha>\beta$ and $A<0$ the region can be either a donor or a transferee). It proves to be true both for a donor region and a transferee. In the latter case taxation level growth caused by transfer increase is determined by an excess of substitution effect over income effect.

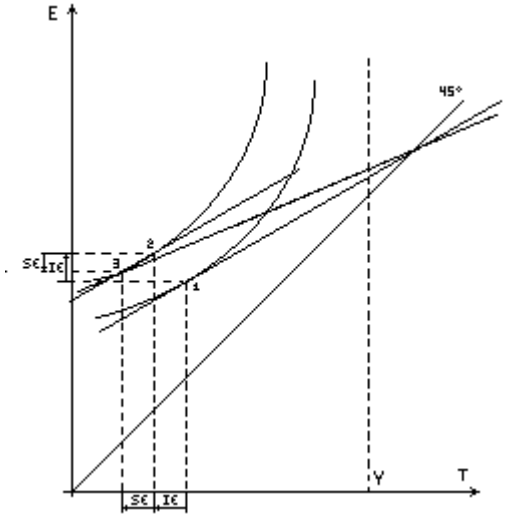
The derivative of optimum expenditure value with respect to γ proves to be negative only if $A>0$ and $Y<\frac{|A|}{(\alpha-\beta)}$. The situation under consideration might be caused by close values of α and β, i.e. by symmetry between the rules of regional 'normative' and actual revenue and expenditure variables calculation sus-

tained while allocating transfers. Then the region being a donor (transfer value proves to be negative), γ value growth results in shifting budget constraints downwards and reducing budget expenditures. Otherwise, if the region can be either a donor or a transferee (when A>0 and $\alpha>\beta$, the region is only a transferee and when $A<0$ and ~~$Y>\frac{|A|}{(\alpha-\beta)}$~~ , it can be both)[24], the derivative proves to be positive, i.e. transfer growth causes expenditure increase. In case of region-transferee it means that income effect dominates over substitution effect, and in case of donor region positive substitution effect exceeds negative income effect. In general such situation proves to be more probable when α exceeds β to a larger degree, which results in a bigger substitution effect. In the case under consideration objective function characteristics secure expenditure growth caused by γ value increase, when $A<0$ and ~~$Y>\frac{|A|}{(\alpha-\beta)}$~~ .

3. Let's dwell upon the model, in which $\alpha<\beta$. It means that the methodology for transfer value calculation is determined by actual tax revenues value rather than by actual expenditures. If $A>0$ and $\alpha<\beta$, the region proves to be a transferee $T>T_0$.Then if γ value is growing (see Fig. **Ошибка! Источник ссылки не найден.**), regional authorities reduce taxes and increase expenditure by reason of revenues growth (the shift from point 1 to point 2).But the peculiarity of transfer calculation method mentioned above might cause a larger tax reduction on account of partial compensation for lost revenues attained by the transfer. Budgetary balance demands that expenditure be decreased for the transfer fails to provide an adequate compensation for tax reduction. Corresponding budget constraint turn, the slope of which is determined by the degree of β value excess over α, results in the solution that is achieved in point 3.

[24] If $\alpha>\beta$ but $A<0$ the region proves to be a transferee, when actual tax revenues and expenditures exceed a certain value, i.e. $T^*>T_0$ where $T_0=\frac{A}{\square-\alpha}$. If $T^*<T_0$, the region proves to be a donor and increase in γ leads to increase in the volume of resources taken from its budget while performing interregional redistribution. In this case γ growth results in budget constraint shift downwards. In any case tax burden grows and any modification in expenditure value depends upon the correlation between income effect and substitution effect.

FIGURE 9



Thus, in the case under consideration tax revenue reduction is always determined by transfer growth and budget expenditures can either increase (if income effect exceeds substitution effect) or decrease (if it's the other way round). Expenditure reduction within transfer value growth can be caused by sufficient excess of β value over α.

From equation (35) it can be concluded that the derivative of optimum expenditure value with respect to parameter γ proves to be positive, if $A>0$ and $Y<\frac{A}{(\beta-\alpha)}$. The latter are caused by value β sufficient excess over α (the transfer is focused upon actual tax revenues rather than actual public expenditures). Then optimum expenditure growth is dependent on increase in transfer value, which (the transfer) is always positive. Consequently, if Y value grows, income effect always exceeds substitution effect.

If $Y>\frac{A}{(\beta-\alpha)}$, then two variants are possible: 1) the region proves to be a financial aid recipient ($0<T^*<\frac{A}{(\beta-\alpha)}$). Then transfer growth results in expenditure increase analogously to the previous case. 2) The region proves to be a

donor ($\frac{A}{(\beta-\alpha)} < T^* < Y$). Then transfer growth tapping off regional resources, causes expenditure increase for negative income effect is less than positive substitution effect by its absolute value (module).

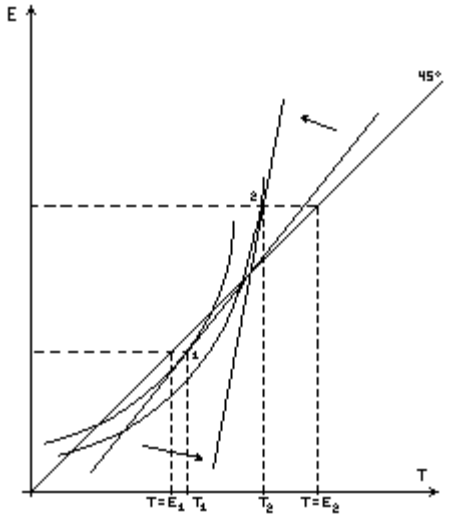
If $A>0$, then when $\alpha<\beta$ the region never proves to be a financial aid recipient but a donor. The expenditure derivative with respect to transfer amount is negative. Therefore, γ growth can be interpreted as a decrease in the resources left at the regional authorities' disposal, which results in expenditure reduction.

The sign of the derivative from optimum tax value with respect to γ value is defined by A sign. If $A>0$ the region proves to be a transferee ($\alpha<\beta$, $T^*<T_0$) and as long as γ grows taxes are on the decrease on account of income effect domination. If the region proves to be a federal budget donor (it becomes possible when $T^*>T_0$), then along with γ growth the transfer, being in this case negative (budget constraint is shifted upwards as long as its slope diminishes), is also increased, which leads to tax revenue decrease for income effect (negative) is less than positive substitution effect.

If $A<0$ And $\alpha<\beta$ the region always proves to be a federal budget donor. Therefore, γ growth shifts budget constraint downwards, which results in regional tax revenue increase caused by income effect.

It should be mentioned that when $\alpha>\beta$ with $A<0$, the change in γ can lead to the transformation of a transferee region into a donor (in former case on account of budget constraint shift downwards, if $A>0$) and a donor region into a financial aid recipient (in the latter case on account of budget constraint shift upwards, when $A>0$). It should be considered that following the rules of transfer allocation asymmetrical to values actual taxes and expenditures calculation the turn of the budget constraint fails to provide any change in revenue and expenditure values, which in the former case proves to be the starting point and in the latter the last point for the region being a transferee (T^*). Therefore, the shift of the region from one group into the other (the change in position of point T^* relative to point T^0) is determined by the substitution effect:

FIGURE 10



Now, let us analyze the impact of changes in α and β values on regional fiscal behavior. Change in α corresponds to the modification in the methodology of federal financial aid allocation. Alongside with that the degree of taking into account the regional budget expenditures while calculating financial aid value is changed. Corresponding private derivatives of optimal tax revenue and expenditure values with respect to α go as follows:

$$\frac{\partial T^*}{\partial \alpha} = \frac{a\gamma\widehat{E}}{(a+1)(1-\gamma\beta)} > 0 \qquad (38)$$

$$\frac{\partial E^*}{\partial \alpha} = \frac{\gamma Y(1-\gamma\beta) - \gamma\widehat{E}(1-\gamma) - \gamma^2(1-\beta)\widehat{T}}{(a+1)(1-\gamma\alpha)^2} \qquad (39)$$

The derivative of optimal expenditure value with respect to α proves to be positive, if $Y>((1-\gamma)\widehat{E} + \gamma(1-\beta)\widehat{T})/(1-\gamma\beta)$, i.e. regional public revenues are large in comparison with the equation dependent upon 'normative' expenditures, fiscal capacity and $\gamma\beta$ parameter value. The derivative proves to be positive, if the product term is small. Under such conditions if the formula of transfers allocation is modified so as actual expenditures could be dominant, regional expenditures prove to be growing. When γ times β is large enough (i.e. the transfer covers the substantial part of expenditures and revenues gap and revenues calculation is

largely determined by actual revenues), expenditure might decrease along with α growth (the derivative is negative).

Partial derivative of tax revenues with respect to α parameter characterizing the degree of actual expenditures influence exerted upon transfer calculation always proves to be positive. Tax revenue increase performed along with α growth means that while calculating the amount of financial aid to the region tax revenues increase as long as the influence exerted by actual expenditure grows. It can be explained by the fact that along with α growth regional administration profits by actual expenditure increase for the latter exerts a larger influence upon transfer amount (the federal government matches the expenditure with the grant). Intensifying the expenditure growth to a large extent regional authorities strengthen their influence upon transfer value and increase their utility function value even despite tax growth necessary for adhering to budget constraint.

The influence produced by the change in actual tax revenues participation in transfers allocation formula on regional administration optimal choice can be analyzed on the basis of optimal expenditure and tax value derivatives with respect to β parameter:

$$\frac{\partial T^*}{\partial \beta} = \frac{-a\gamma[\gamma(1-\alpha)\widehat{E} + (1-\gamma)\widehat{T}]}{(a+1)(1-\gamma\beta)^2} < 0 \qquad (40)$$

$$\frac{\partial E^*}{\partial \beta} = -\frac{\gamma(Y-\widehat{T})}{(a+1)(1-\gamma\alpha)} < 0 \qquad (41)$$

From equation (40) it can be concluded that the derivative of the optimal tax value with respect to β always proves to be negative, therefore, the more the Federal Center is orientated to actual regional tax revenues while calculating a transfer (i.e. participate in regional revenues formation), the less tax burden will be imposed by regional authorities. In other words, while transfer amount is being defined by the Federal center, β value, which characterizes the weights assigned to fiscal capacity and actual tax revenues while implementing transfers allocation formula, comes to determine the intensity of regional authorities' fiscal incentives.

The negative sign of partial derivative E^* with respect to β is defined by the fact that regional fiscal capacity always proves to be less than its gross income, i.e. even if actual tax revenues equals regional fiscal, net disposable income of regional economic agents still proves to be positive. The interpretation of regional budget expenditure decrease performed under higher weight assigned to actual tax revenues within transfer allocation mechanism is similar to tax revenue deriv-

ative with respect to α. The more financial aid calculation depends upon actual tax revenues, the more profitable it is for the regional administration to lower taxes though it might cause expenditure decrease (tax reduction is essential for adhering to the budget constraint as long as the transfer fails to provide complete compensation for tax revenues decrease).

The comparative statics analysis of the results produced by the model can be combined in the following table:

TABLE 1.

	Y	$\widehat{E}$	$\widehat{T}$	α	β	γ
Derivative of E^*	+	+	–	?[#]	–	?[##]
Derivative of T^*	+	–	+	+	–	?[###]

[#] – depends upon the correlation between all the parameters

[##] – «+", if $\alpha>\beta, A>0$; and «–", when $\alpha<\beta, A<0$; depends upon the correlation between $Y(\alpha-\beta)$ and A in other cases;

[###] – «+", if $A<0$; «–», when $A>0$.

Empirical Analysis

The following section consists in the statistic verification of some hypotheses advanced above within shaping and analyzing the model of regional authorities' fiscal behavior.

First of all, we'll consider the correspondence of budget constraint performed in the model to real state of things on the basis of regional budget statistics available. Budget constraint described is based upon the assumption that federal authority distribute financial aid to the regions partially compensating for regional budget revenues and expenditure gap and revenues as well as the assumption that estimates of regional expenditures and revenues proves to be the weighted average of actual and 'normative' or potential revenues and expenditure. In order to check up the correspondence of such hypothesis to empirical data we'll analyze the parameters of the given budget constraint structure, which performs the model of financial aid allocation among the Federation subjects. Besides, we'll try to analyze the parameters of other possible transfer allocation mechanisms and verifying adequacy of the latter to empirical data we'll arrive at the conclusion whether chosen budget constraint within region fiscal behavior model proves to be correct.

Then we'll try to analyze estimated values of α, β, γ and interpret the changes in these values within different time periods. Alongside with that it is possible to assume that α and β modification was determined by the change in both transfer allocation mechanism and transfer amount received from regional financial support fund, the latter being based on rather formalized rules if compared to other kinds of financial aid. It can be also assumed that γ value was changed along with the modification in financial aid amount regarding the gap between aggregate revenues and expenditure of the regions. Federal financial aid structure and its value are performed in table 2.

TABLE 2. *FEDERAL FINANCIAL AID RECEIVED BY FEDERATION SUBJECTS IN 1992-2001 (% GDP)*

	1992	1993	1994	1995	1996	1997	1998	1999	2000*	2001**
Subsidies		0,02%	0,09%	0,06%	0,09%	0,13%	0,10%	0,06%	0,15%	0,14%
Subventions	0,79%	0,69%	0,42%	0,12%	0,12%	0,09%	0,02%	0,20%	0,03%	0,11%
Transfers from FFAF			0,36%	1,17%	1,04%	1,22%	1,12%	0,98%	0,95%	1,19%
Transfers from indemnification fund										0,54%
Transfers from regional development fund										0,04%
Transfers from regional budget development fund										0,01%
Mutual off-set funds	0,61%	1,95%	2,54%	0,42%	0,81%	0,43%	0,36%	0,14%	0,16%	
Budget loans less repayment:	0,09%	0,03%	0,02%	0,04%	0,23%	0,64%	-0,03%	-0,28%	0,01%	
Other kinds of financial aid										0,37%
Total: funds received by other levels of government	1,49%	2,70%	3,4%	1,8%	2,3%	2,5%	1,60%	1,37%	1,30%	2,40%
The share of federal financial aid in federal budget expenditure	6,87%	12,73%	14,87%	10,97%	14,76%	16,35%	11,07%	9,35%	11,11%	
The share of transfers from FFAF and IF in federal financial aid to the regions (exclusive of loans)	0,0%	0,0%	10,5%	65,6%	49,3%	65,4%	68,5%	59,4%	71,37%	72,04%
* data for Jan. – Sept. 2000 ** plan										

Source: Russian Federation Ministry of Finance, the calculations done by the authors.

Another task of the following section is to verify the hypothesis following from the model shaped for regional authorities' fiscal behavior. The model shows that within different parameters of financial aid allocation mechanism applied the

modifications in financial aid values cause the different changes in regional tax revenues and expenditures. Thus, within symmetrical financial aid allocation mechanism (inclusive of the one focused on 'normative' revenues and expenditures) financial aid value modification resulted from income effect must lead to budget expenditure growth by the value less than transfer value along with simultaneous tax reduction. Within the methodology asymmetrical to revenues or expenditure in regard to their 'normative' and actual values the influence of transfer amount modification exerted upon regional revenues and expenditure values is not clear a priori for, besides income effect, financial aid modification causes substitution effect as well.

If the allocation formula is orientated on actual expenditure value rather than on actual taxes revenue (i.e. it is orientated on fiscal capacity rather than 'normative' expenditure needs value, $\alpha>\beta$), financial aid increase always results in expenditure growth (the substitution effect is positive). But if parameter α sufficiently exceeds α, substitution effect, which may be positive in this case, can also cause taxes revenue increase.

When financial aid allocation formula is orientated on actual tax revenues rather than on actual expenditures value ($\alpha<\beta$), financial aid growth leads to tax revenue reduction and expenditures increase. But if parameter β sufficiently exceeds α it is possible that expenditures be reduced by substitution effect.

In other words, if $\alpha>\beta$ along with γ growth, expenditures always grow as well as taxes usually decrease. When $\alpha<\beta$ along with γ growth taxes always decrease as well as expenditures usually grow. If γ falls, taxes always grow and expenditures usually decrease.

In order to verify the hypothesis about similar federal attitude assumed towards different regional groups we can single out a group characterized by a high level of independence from federal support and will do the calculation within its assumed fromula for financial aid allocation.

In the previous chapters it was assumed that fiscal incentives prove to be transfer amount impact on tax revenue. From the point of view of optimization problem for a choice made between taxes and expenditures within given transfer allocation formula, fiscal incentives act as to perform optimal tax revenue and expenditures modification in order to increase regional welfare. Within the framework of the research conducted no empirical calculations of Russian region utility function will be done but a definition of fiscal incentives will be provided in the same manner it is done by Juravskaya[25]. Fiscal incentives prove to appear

[25] See *Juravskaya (1998)*

when the federal authorities shaping the formula of financial aid allocation create conditions, which cause the modification in optimum choice between regional budget revenues and expenditures. If it can be assumed that the Federal Center be aimed at the increase in the regional public goods consumption, then the formula of financial aid allocation should favor expenditure growth caused by transfer increase without any tax reduction. The latter can be interpreted as negative fiscal incentives[26].

In order to increase regional welfare it is essential that the Federal Center strive both for a better public goods provision and increase in regional private goods consumption, which results from tax burden relief. The transition to a higher social welfare curve might serve as a criterion. In general, first it is necessary that optimal choice between private and public goods consumption be defined (it mustn't be an individual but a federal decision) and then the conditions, which provide that regional revenues and expenditures match this optimal ratio, be considered as positive fiscal incentives.

In order to verify the hypotheses about gaining this or that fiscal incentives to modification in regional budget expenditure and revenues values determined by financial aid we'll analyze interdependence between financial aid amount and revenues and expenditure values[27], which could be regarded on the basis of the parameters calculated within financial aid allocation formula. Besides, the less γ value is, the worse the dependence should be (it can be assumed that the less γ is, the more all the coefficients approach zero, which leads to decrease in value within the same dispersion).

Analyzing the model for regional authorities' fiscal behavior we can arrive at the conclusion that on less weight assigned to actual expenditures in comparison with 'normative' expenditure needs (α value decrease) actual expenditures

[26] To be precise, the model analyzed above results in a more strict definition of negative fiscal incentives. If it could be assumed that while shaping budget equalization formula, the federal government is aimed at the increase in regional welfare (the increase in public and private goods consumption in proportion correspondent to public preferences) but at public goods supply avoiding negative influence exerted upon tax revenue (per capita), then fiscal incentives would prove to be negative, when any modification (increase or decrease) in transfer value or in transfer allocation formula leads to tax revenue reduction and (or) budget expenditures decrease. Besides, tax and expenditure derivative with respect transfer value determines the intensity of the incentives.

[27] Similar to shaping theoretical model, the empirical analysis in its turn also happens to be deflected from the fact that it is however not public goods provision formation that regional budget expenditure is directed to.

prove to decrease. But if the degree of covering the revenues and expenditure gap is rather high (γ_parameter), expenditures tend to grow. Alongside with that α value increase always results in tax growth. The modifications in financial aid allocation formula in order to focus the latter on fiscal capacity rather than actual taxes revenue (β value decrease) leads to regional tax revenues growth and actual expenditures increase.

Unfortunately, the lack of a long-term IGFR history in Russia doesn't give a chance to verify the results of the model analysis concerning the impact of parameters changes in α and β on revenues and expenditure value chosen by the region. Therefore, we'll compare only signs of changes of α and β with the signs of changes in revenues and expenditures within adjacent years.

Thus, the analysis of optimal regional tax revenues and expenditures makes it possible to undertake an empirical verification of the hypotheses formulated above on the basis of data gathered for Russia in 1995-1999.

The empirical verification will be based upon different financial aid allocation principles including four major factors, which according to our assumption could be determinant for financial support allocation between Russian Federation subjects.

1. *Actual budget revenues of a Federation subject (per capita)* From the assumptions made on the basis of the substantiated theoretical model it can be concluded that each region should have enough resources to finance minimum public goods production per capita. Therefore if it is assumed that the regions put forth equal tax efforts, i.e. regardless potential taxes revenue, low taxes revenue level (less than 100%) could be compensated for by financial aid provided by the federal government.

2. *Fiscal capacity of Federation subject budget (potential tax revenue per capita)* Tax revenues are determined by two groups of factors. The first consists in objective parameters characterizing tax base as well as tax rate and independent from regional government's decisions. The second performs the parameters within the regional administration competence (regional and local tax rate, the intensity of tax arrears recovering (?), scope of tax benefits granted, etc.) Thus, it can be assumed that financial aid allocation done by federal authorities be determined not only by actual tax revenues for it sometimes fails to reflect real capacity of the region for budget revenues raising but by objective tax revenues as well (i.e. regional fiscal capacity). The latter comes to define the capacity of regional taxpayers for financing the necessary public goods provision level, which is calculated as the product of standard (average or maximum) tax rate and its base.

The calculation of the Federation subject fiscal capacity performed by the IET[28] was used in order to do necessary empirical calculations.

3. *Regional budget actual expenditures (per capita).*Within the assumption that budget expenditure efficiency of different regions can be hold up under comparison it is possible to arrive at the conclusion that regarding objective factors, which come to determine regional budget expenditure needs, the Federal Center aims at establishing similar expenditure value for each region attained by equalization. Alongside with that it is assumed that the difference in actual budget expenditures results from the influence exerted by the factors, which characterize objectively different regional needs connected, for example, with population structure, climate etc. Although the premise that actual and standard expenditure be close to each other might fail to come true and interbudgetary equalization might be aimed at equalization of regional capacity for minimum (standard) public goods provision level, financial aid allocation could not be influenced by regional expenditures, which is determined by objective differences in volume and price, but by regional budget actual expenditures. The usage of actual regional budget expenditures within transfer calculations is caused by several reasons inclusive of budget reform inertness in the region (in case of sufficient gap between actual and 'normative' expenditure, the one determined by the existing network of public organizations and agencies) as well as different subjective factors (regional authorities' lobbying for the Center's support for certain expenditure items, etc.)

4. *The 'norms' of regional budget expenditure needs*. As it was mentioned above, interbudgetary equalization should be aimed at achievement of equal regional capacity to finance some standard level of public goods provision. But it can be stated that actual expenditures fail to characterize well enough regional objective needs in public services provision. Besides objective factors, interregional differentiation of the actual public goods provision level in different regions can be caused by the regional level of fiscal capacity provided as well as with different regional efficiency in budget expenditure execution. That's why, proceeding from federal authorities' rational behavior, it can be assumed that within budget equalization formula the Federal Center is orientated to both actual expenditure and 'normative' expenditure needs value the latter being different for different regions and dependent upon a number of objective factors[29].

[28] See Batkibekov, Kadotchnikov, Lugovoy, Sinelnikov, Trounine (2000)

[29] For more detail see the report on "Normative expenditure needs for the Federation Subjects in Russia" (1999).

In general intergovernmental equalization mechanism can be formulated as follows (all indexes are given in per capita terms):

$$Tr_i = f\left(T_i, \widehat{T}_i, E_i, \widehat{E}_i\right) + \varepsilon_i \qquad (42)$$

where

Tr_i - financial aid value (The sum of all kinds of financial support for i-region: the transfers from regional financial aid fun, mutual settlements, budget loans, funds in support for north import)

T_i – actual tax revenues of *i*-region budget;

$\widehat{T}_i$ – fiscal capacity of *i*-region budget;

E_i – actual expenditures of *i*-region budget;

$\widehat{E}_i$ – 'normative' expenditure needs;

ε_i – actual financial aid deviation from calculated value, which might be caused by additional factors dependent, for example, upon the political power of regional administration.

It can be assumed that within the framework of budget execution financial aid to the region in current year is determined both by figures of current year (actual revenues and expenditure) and also by actual revenues and expenditure during the previous year as well as by revenues and expenditures, fiscal capacity and expenditure needs standards with two-year lag. The latter can be explained by some peculiarities of budget planning timing process, which demand that the data of the year before the previous be the only data available for transfer allocation calculation from FFAR and some other kinds of financial aid for the next year calculated within the current year. (e.g. the transfers from FFAF for 2000 were distributed on the basis of 1997 data as well as planning of financial aid for 2001 was based upon 1999 data). Alongside with that the allocation of some other kinds of financial aid to the regions is determined by the indexes of either the previous or the current year.

Practically all the 89 russian regions prove to be financial aid recipients of this or that kind. That's why all the Federation subjects except for Chechenskaya Republic will be considered within the estimation of equalization parameters offered. Besides, some equations will be calculated for one third of the transferees receiving the highest amount of federal financial aid (per capita). Let's estimate the hypotheses assuming that different financial aid allocation formulas, which are orientated to various combinations of the mentioned above parameters characteristic of the regional need in federal support, be applied by the Federal

authorities. Then it will be possible to estimate if the budget constraint of the regional administration assumed within fiscal behavior model conforms with the real life on the basis of comparison between the estimation results for different models.

Equalization of actual tax revenues is one of the simplest variants of inter-budgetary equalization. Alongside with that transfer value is calculated by the formula:

$$Tr_i = \gamma\left(\overline{T} - T_i\right) \tag{43}$$

where $\overline{T}$ – tax revenues after equalization (per capita, the same for all the regions)

Corresponding regression is as follows:

$$Tr_i = a_0 + a_1 T_i + \varepsilon_u \tag{44}$$

If a_1 significantly different from zero (at 5% critical level), then equation (43) parameters can be calculated as follows:

$$\gamma = -a_1, \quad \overline{T} = -a_0 / a_1 \tag{45}$$

The results of OLS estimations of this equation for 1994-1999 are given in the tables below (statistically significant coefficients are written in the bold type, gray color means lag combinations, which were not calculated, significance for adjusted R-square is given according to F-statistics significance at 5% critical level). In the table the years of financial aid actual allocation are given vertically, and the years for which corresponding lagged explanatory variables are used are given horizontally[30].

$\overline{T}$		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**13,421**				
	1995	**7,423**	**7,348**			
	1996	**8,463**	**8,309**	**7,918**		
	1997	**7,226**	**7,094**	**6,829**	**8,807**	
	1998		**6,825**	**6,601**	**8,149**	**12,143**
	1999			**6,255**	**7,128**	**17,529**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,553**				
	1995	**0,454**	**0,411**			
	1996	**0,404**	**0,382**	**0,400**		
	1997	**0,367**	**0,340**	**0,350**	**0,207**	
	1998		**0,303**	**0,308**	**0,194**	**0,049**
	1999			**0,326**	**0,235**	**0,034**

[30] Thus, for 1997 transfer calculated on the basis of 1995 data after-equalization tax value equals 7,094, γ=0,340, the adjusted R^2 for corresponding regression equals 0,487.

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,340**				
	1995	**0,411**	**0,376**			
	1996	**0,358**	**0,359**	**0,367**		
	1997	**0,475**	**0,487**	**0,489**	**0,201**	
	1998		**0,480**	**0,469**	**0,231**	**0,188**
	1999			**0,577**	**0,362**	**0,089**

Another possible variant of equalization is the equalization of regional fiscal capacity. The equalization formula is similar to (43):

$$Tr_i = \gamma\left(\overline{T} - \widehat{T}_i\right) \qquad (46)$$

where $\widehat{T}_i$ – fiscal capacity of *i*-th regional budget;

γ – share of the gap between regional revenue and expenditure values that is covered by equalization transfers (equal for all regions participating in the equalization and determined by the amount assigned for equalization transfers in the federal budget).

Corresponding regression is as follows (the model (46) parameters are calculated by (45) formula):

$$Tr_i = a_0 + a_1\widehat{T}_i + \varepsilon_u \qquad (47)$$

The results of OLS estimations of this regression for 1994-1999 are given in the tables below (statistically significant coefficients are written in the bold type).

$\overline{T}$		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**16,816**				
	1995	**15,658**	**15,658**			
	1996	**19,415**	**19,415**	**19,415**		
	1997	15,756	15,756	15,756	15,756	
	1998		13,542	13,542	13,542	**10,006**
	1999			**13,374**	**13,374**	**9,667**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,207**				
	1995	**0,152**	**0,152**			
	1996	**0,118**	**0,118**	**0,118**		
	1997	0,127	0,127	0,127	0,127	
	1998		0,120	0,120	0,120	**0,157**
	1999			**0,099**	**0,099**	**0,135**

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,053**				
	1995	**0,058**	**0,058**			
	1996	**0,074**	**0,074**	**0,074**		
	1997	0,023	0,023	0,023	0,023	
	1998		0,032	0,032	0,032	**0,037**
	1999			**0,125**	**0,125**	**0,154**

A great number of similar results given for different years in the tables are explained by the fact that fiscal capacity estimates for 1997 –1998 were the only available. For earlier time periods fiscal capacity was estimated by deflating the base value. Thus, some regression equations estimated prove to be the same equations but in different prices.

It is in the same manner with intergovernmental equalization according to revenues criteria that regional equalization according to actual or necessary expenditures criteria. But we won't shape equalization models based only on expenditure criteria but will include both expenditures (expenditure needs) and tax revenues (fiscal capacity).into the equalization models. In this case it can be assumed that the Center allocating financial aid to the regions be orientated to actual regional budget deficit and (or) the gap range between 'normative' expenditures and fiscal capacity.

Equalization based upon partial compensation for actual deficit results in financial aid calculation by formula:

$$Tr_i = \gamma\left(E_i - T_i\right) \tag{48}$$

Corresponding regression is as follows:

$$Tr_i = a_0 + a_1\left(E_i - T_i\right) + \varepsilon_i \tag{49}$$

Unlike theoretical part of the work this section contains no assumptions that each region should follow budget constraint $T+Tr=E$ for it is possible that the deficit be financed for by regional borrowings. Therefore, the estimation of this equation can't be considered just as the estimation of budget constraint parameters in the region.

OLS estimation results of the equation for 1994-1999 are given below (statistically significant coefficients are in the bold type).

a_0		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,612**				
	1995	-0,203	-0,186			
	1996	0,270	0,310	-0,126		
	1997	-0,046	0,106	-0,255	-0,173	
	1998		-0,018	-0,321	-0,244	**0,731**
	1999			-0,054	-0,041	**0,683**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,643**				
	1995	**0,381**	**0,477**			
	1996	**0,331**	**0,407**	**0,431**		
	1997	**0,269**	**0,239**	**0,323**	**0,258**	
	1998		**0,272**	**0,291**	**0,232**	-0,046
	1999			**0,200**	**0,174**	-0,034

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,741**				
	1995	**0,471**	**0,549**			
	1996	**0,390**	**0,438**	**0,537**		
	1997	**0,417**	**0,349**	**0,434**	**0,357**	
	1998		**0,372**	**0,439**	**0,358**	**0,153**
	1999			**0,273**	**0,213**	**0,084**

Besides, equalization mechanisms similar to (43) and (46), which are not based upon actual revenues and expenditures but upon their 'normative' or potential values, i.e. fiscal capacity and expenditure needs, prove to be possible. Corresponding formula for calculating financial aid amount allocated by the Federal Center goes as follows:

$$Tr_i = \gamma\left(\widehat{E}_i - \widehat{T}_i\right) \qquad (50)$$

Corresponding regression is as follows:

$$Tr_i = a_0 + a_1\left(\widehat{E}_i - \widehat{T}_i\right) + \varepsilon_i \qquad (51)$$

OLS estimation results of this equation for 1994-1999 are given in the tables below (statistically significant coefficients are in the bold type).

a_0		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,795**				
	1995	**0,426**	**0,426**			
	1996	**0,785**	**0,785**	**0,785**		
	1997	**0,262**	**0,262**	**0,262**	**0,262**	
	1998		0,122	0,122	0,122	**1,134**
	1999			0,135	0,135	**1,049**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,457**				
	1995	**0,358**	**0,358**			
	1996	**0,317**	**0,317**	**0,317**		
	1997	**0,296**	**0,296**	**0,296**	**0,296**	
	1998		**0,278**	**0,278**	**0,278**	**0,309**
	1999			**0,246**	**0,246**	**0,289**

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,409**				
	1995	**0,442**	**0,442**			
	1996	**0,382**	**0,382**	**0,382**		
	1997	**0,585**	**0,585**	**0,585**	**0,585**	
	1998		**0,633**	**0,633**	**0,633**	**0,540**
	1999			**0,543**	**0,543**	**0,517**

In theory, it is possible that equations (49) and (51) be estimated so as they won't include deficit variable but separate budget revenues and expenditures var-

iables (fiscal capacity and expenditure needs). In practice it means that revenue and expenditure weights are different in the transfer allocation formula. But there is a multicollinearity between these variables and for that reason estimations for these two simple equations were not made.

The most general linear formula of financial aid allocation can be written as follows:

$$Tr_i = b_0 + b_1 E_i + b\widehat{E}_i + b_3 T_i + b_4 \widehat{T}_i + \varepsilon_i \qquad (52)$$

If this formula is transformed to the (26) type considering that transfers for all regions are calculated according to one and the same equalization formula, then equation (52) corresponds to the following equalization mechanism:

$$Tr_i = Tr_0 + \gamma_\alpha [\alpha E_i + (1-\alpha)\widehat{E}_i] - \gamma_\beta [\beta T_i + (1-\beta)\widehat{T}_i]\} \qquad (53)$$

Such formula includes fixed amount of aid (per capita) Tr_0 and aid to cover a share of the gap between regional revenues and expenditures. Revenue and expenditure sides within this formula are weighted sums of actual and 'normative' or potential values, besides, the sum of weights in this case is less than unity (only cases when $\gamma_\alpha<1$ и $\gamma_\beta<1$ are considered). Unlike previous interbudgetary equalization formulae, the equation (53) can't be transformed so as multicollinearity of the variables could be reduced, that's why no estimations were made directly for this equation at present stage of research[31]. (30)

Less general model for federal financial aid allocation also containing both regional budget actual revenues and expenditures and fiscal capacity with expenditure needs could be presented by a linear formula like:

$$Tr_i = \gamma\{[\alpha E_i + (1-\alpha)\widehat{E}_i] - [\beta T_i + (1-\beta)\widehat{T}_i]\} \qquad (54)$$

As it was mentioned above this equation corresponds to equalization formula, which partially covers the gap between budget revenues and expenditures calculated as weighted sum of actual and 'normative' of potential values. In order to avoid multicollinearity of the variables as well as to insert necessary constraints on coefficients into the equation (54),the latter can be rewritten into:

$$Tr_i = \gamma\alpha(E_i - \widehat{E}_i) - \gamma\beta(T_i - \widehat{T}_i) + \gamma(\widehat{E}_i - \widehat{T}_i) \qquad (55)$$

The equation transformed in this way gives the following additional meaning of this equalization formula: the transfer can be decomposed into three parts such as partial compensation for theoretical (predicted) deficit (the gap between

[31] The 'normative' variables happen to have a high correlation coefficient with both actual revenues and actual expenditures as well as with the deviation of the latter from the normatives.

expenditure needs and fiscal capacity), compensation for deviation of actual expenditure form its 'normative' value (if $\alpha>0$) and compensation for actual revenues deviation from fiscal capacity (if fiscal capacity is bigger than actual revenues, otherwise the item is less than zero).

Corresponding regression is:

$$Tr_i = a_0 + a_1(E-\widehat{E})_i + a_2(T-\widehat{T})_i + a_3(\widehat{E}-\widehat{T})_i + \varepsilon_i \qquad (56)$$

Alongside with that it is assumed that the following hypotheses be not rejected:

$a_0=0,\ a_1>0,\ a_2<0,\ a_3>0,\ a_3>a_1,\ a_3>|a_2|.$ (57)

Thus, α, β and γ can be calculated as;

$\alpha = a_1/a_3,\ \beta = -a_2/a_3,\ \gamma = a_3.$ (58)

The OLS estimation results of the equation for 1994-1999 are given in the tables below (statistically significant coefficients are in the bold type).

a_0		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**-0,855**				
	1995	**-0,355**	**-0,450**			
	1996	0,177	0,125	**-0,451**		
	1997	-0,120	-0,025	**-0,311**	-0,246	
	1998		-0,139	**-0,372**	**-0,382**	**1,044**
	1999			-0,237	-0,261	**0,991**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,782**				
	1995	**0,531**	**0,598**			
	1996	**0,438**	**0,492**	**0,576**		
	1997	**0,378**	**0,384**	**0,415**	**0,385**	
	1998		**0,356**	**0,379**	**0,370**	**0,294**
	1999			**0,321**	**0,328**	**0,244**

α		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,781**				
	1995	**0,556**	**0,674**			
	1996	**0,500**	**0,589**	**0,696**		
	1997	**0,378**	**0,331**	**0,441**	**0,345**	
	1998		**0,320**	**0,414**	**0,327**	**0,520**
	1999			**0,355**	**0,232**	**0,119**

β		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,903**				
	1995	**0,923**	**0,794**			
	1996	**0,895**	**0,819**	**1,095**		
	1997	**0,537**	**0,581**	**0,747**	**0,551**	
	1998		**0,601**	**0,715**	**0,676**	-0,058
	1999			**0,745**	**0,820**	-0,045

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,902**				
	1995	**0,667**	**0,746**			
	1996	**0,533**	**0,568**	**0,697**		
	1997	**0,672**	**0,651**	**0,696**	**0,641**	
	1998		**0,707**	**0,738**	**0,701**	**0,627**
	1999			**0,609**	**0,606**	**0,476**

Comparing the estimations done for the models (43), (46), (48), (50) and (54) we can arrive at the conclusion that the latter model is the best, which corre-

sponds with the hypothesis that within these years Russian Federal Center allocated financial aid among the regions on the basis of the factors used in formula (54) and was aimed at partial compensation for revenues and expenditure gap calculated as weighted actual and 'normative' or potential values. Besides, as it was mentioned above (see the theoretical section as well), coefficients α and β characterize the impact of actual expenditures and tax revenues on financial aid amount: the bigger the coefficients are, the less financial aid amount depends upon 'normative' value, which means that the regions have more options to manipulate modifying own expenditures and revenues in order to exert an influence upon financial aid amount. Analyzing the dynamics of estimated coefficients α, β and γ, almost all of which prove to be significant, we can conclude the follows:

1. According to successive comparison of the calculations done for each year it can be stated that coefficient γ was decreasing. It shows that within the last years regional authorities have been accounting less on federal financial aid allocated in order to cover the gap between budget revenues and expenditures. If the transfer amount (see formula (55)) is calculated as the sum of equal gap shares between actual revenues and expenditure as well as between 'normative' values, γ value decrease creates incentives for regional authorities to adjust their actual revenues and expenditures with 'normative' or potential values (revenue capacity is usually higher than actual revenues and 'normative' expenditures is usually lower than actual ones).

2. The comparison of estimated α values for each year also shows some decrease in the coefficient (though, it's not monotonous). It proves the assumption that financial aid allocation methodology was improving as long as while calculating financial aid amount the federal center turned from actual expenditure focus to 'normative' values. It is in the same manner that β value dynamics be analyzed. Although no sufficient decrease can be observed within β dynamics, it should be noted that for 1998 β coefficients proved to insignificantly differ from zero. Thus, the results of α and β coefficients' estimation show that regardless of the implemented transfer allocation formula there was a shift within federal financial aid calculations from the focus on actual regional revenues and expenditures to the focus on some expected revenues and necessary expenditures close to the 'normative' values and fiscal capacity estimated. In practice this conclusion can be explained by the fact that a new formula and methodology of financial aid allocation from the federal Fund for financial assistance for the regions was introduced only in 1999 and transfer amount received by the Federation subjects from the FFAR in 1998 was defined in the during the parliamentary debates about the Federal Budget bill not in accordance with any formulas. By 1999 the

policy pursued by federal authorities[32] as well as constraints on the federal budget funds caused by the 1998 financial crisis had resulted in orientation of federal financial aid to the regions that really prove to be in need.

3. It should be noted that α and β coefficients value decrease not only diagonally within the table (year change for both the transfer and revenues and expenditures) but also downwards (transfer amount calculation by 'normative' values and values for the previous years). The following explanation can be accepted. During the time period under consideration the calculations of transfer amount allocated to the regions within the draft plan of federal budget law conceived for the next year were done on the basis of some revenue and expenditure values based on the budget execution data for 1991 agreed with the regional representatives with a great deal of adjustments as well as a two-year lag. Then, as long as the budget bill was passing through the Parliament, financial aid value was being modified. Further on within budget execution during a year the regions could receive additional grants (that were not envisages by the budget plan) to finance their expenditures and compensate for any financial gaps and the Ministry of Finance could either suspend transfer financing or speed it up within the fiscal year. Thus, the calculations of financial aid based upon 'normative' or potential values are done within drafting the federal budget plan as well as current financial aid amount is determined by actual revenues and expenditures for the current period. It results in the fact that though the model estimating financial aid allocation within some year and based upon equalization needs for the previous years is worse to perform actual procedure of financial support, it tends to be focused upon 'normative' rather than actual values (low coefficients α and β). As long as we turn to the models based upon the information close to the time of actual transfer financing, the model fails to be objective (aggregate federal transfer financing depends upon actual revenues and expenditures rather than upon 'normative' or potential values).

4. In general, it can be stated, that α proves to be less than β for almost all allocation models. It means that, while allocating financial aid, the Federal Center is orientated to actual tax revenues rather than to actual expenditures (or visa

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32 By the year 1998 actual transfer value allocated to the regions seized to correspond to the amounts from the Budget law, and the transfer amount was defined by the Ministry of Finance and the Government while budget execution. It should be also noted that in 1998 the Presidents' decree "On the Sanitation of Public Finance" and the Conception of interbudgetary relations reform in the Russian Federation aimed at the enforcement of rules and conditions of financial aid allocation, were adopted.

versa, to expenditure needs rather that to fiscal capacity), which can be explained by the fact that up to 1999 there were no federal methods of fiscal capacity estimation for transfer allocation formula was based upon actual tax revenues. At the same time, the fact that calculations were based upon 1991 expenditure data obliged the federal authorities to define the adjustment index, which proved to bring 1991 expenditures closer to 'normative' rather than actual values. Another assumption is that the range of regional authorities' taxing (or in broad sense – revenues) powers is less that the range of expenditure powers, i.e. regional authorities' decisions within expenditure field can exert a more profound influence upon regional budget financial gap, which federal aid allocation is focused on. Therefore it is lower regional tax revenues that proves to be an objective reason for federal transfer increase rather than budget expenditure overgrowth. It is important that the decrease of possible fiscal incentives gained by regional authorities along with changes in the federal financial aid amount be consequent on the given correlation between α and β. This consequence will be analyzed below.

In order to specify the hypotheses about values of α and β parameters we assumed that while calculating financial aid the latter be decomposed into two parts. The first part consists in the transfers received from the fund of financial support for the regions, which perform a kind of financial aid allocated according to the most formalized rules. Common to all the Federation Subjects formula and approved by Federal budget bill for the next year set the transfer value allocated to the regions. The second part consists in additional financial aid constituted by subsidies, subventions, mutual settlements and budget loan balance. The whole amount of financial aid equals the sum of transfer and additional support, the most part of the latter being dependent upon current regional needs rather than upon objective parameters. Therefore, it can be assumed that bigger α and β values (characteristic of less objective allocation) as well as smaller γ value will be observed within the equations, in which additional financial aid proves to be a dependent variable, as long as smaller α and β values and bigger γ value will be found in the equations, in which a dependent variable substitutes for a transfer in its narrow sense. OLS estimations of equation (56) where dependent variable is the second part of the financial aid are given below:

a_0		Explanatory variables				
		1994	1995	1996	1997	1998
Additional aid	1994	**-0,169**				
	1995	**-0,197**	**-0,197**			
	1996	**-0,170**	**-0,180**	**-0,332**		
	1997	**0,365**	**0,394**	0,088	0,033	
	1998		0,140	0,032	0,120	**0,337**
	1999			-0,067	-0,006	**0,121**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Additional aid	1994	**0,066**				
	1995	**0,071**	**0,088**			
	1996	**0,054**	**0,072**	**0,086**		
	1997	**0,115**	**0,108**	**0,158**	**0,145**	
	1998		**0,077**	**0,095**	**0,071**	**0,061**
	1999			**0,043**	**0,025**	0,015

α		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**1,545**				
	1995	**1,535**	**1,580**			
	1996	**1,537**	**1,542**	**1,512**		
	1997	0,565	0,500	**0,848**	**1,055**	
	1998		0,208	0,495	0,309	**2,246**
	1999			**1,186**	**1,040**	0,309

β		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**2,833**				
	1995	**2,676**	**1,318**			
	1996	**2,444**	**1,306**	**1,756**		
	1997	**1,826**	**1,537**	**1,892**	**1,131**	
	1998		0,961	1,011	0,107	-0,328
	1999			**2,581**	1,840	0,127

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**0,185**				
	1995	**0,212**	**0,196**			
	1996	**0,166**	**0,187**	**0,285**		
	1997	**0,148**	**0,099**	**0,217**	**0,206**	
	1998		**0,141**	**0,159**	**0,122**	**0,411**
	1999			**0,313**	0,040	-0,030

It should be mentioned that the estimations of the regression (56) for the second part of financial aid are characterized by a smaller adjusted R^2. value and a smaller (in general) amount of statistically significant coefficients. It means that additional aid allocation is defined rather arbitrary, though the Federal Center in this case is more orientated to the compensation for the actual deficit, i.e. the gap between revenues and expenditures, in comparison with the previous model. In order to understand the meaning of α and β value exceeding one the modified transfer formula (55) can be used. From the formula it can be concluded that α and β can be interpreted as coefficients as long as actual revenues and expenditure value deviates from 'normative' values. It means that along with γ growth, the part of the transfer compensating for the expenditure deviation from the standards is proportionally increasing. Alongside with that the coefficient might be bigger than one (then it fails to be the weight of actual and 'normative' expenditures). It should be also noted that within the last years of the regarded time-period the most part of the coefficients fails to be significant, which probably can be explained by the reduction in the amount of the second part of financial aid. (see table **Ошибка! Источник ссылки не найден.**).

Analyzing the results, it can be premised that the values of coefficients used in financial aid allocation formula prove to be different for different regions, i.e. the Federal Center treats the regions (or groups of the regions) differently while distributing financial aid. Let's assume that actual financial aid deviation from the unity performed by equation (54) is caused by different γ parameter value and similar α and β values for each region within the same year. If this assumption proves to be true, then the regression residuals (56) can be interpreted as various

γ values for different regions, the deviation of which from the average value performs the variety of regional impact on financial aid amount. Analogously it can be assumed that regression residuals (56) is determined by the difference in either α or β It can be also assumed that some regions differ by all the three coefficients.

In order to verify the hypothesis about the difference in the parameters of federal financial aid formula for different regions it is necessary that highly subsidized regions group (i.e. receiving sufficient financial aid per capita) be distinguished out of all the regions. In this case the group can't be limited to «traditionally» highly subsidized regions (the degree of freedom for the calculations isn't large enough). Besides, financial aid amount received by the regions was sometimes radically modified from year to year, therefore, the selection of the regions constituting the mentioned above conventional group was based upon the following criterion: within each year this group consists in the regions receiving the transfer bigger than monthly minimum of subsistence per person[33]. OLS estimations of the equation (56) for the regions that satisfy this condition (the fact that some region is included in this group depends on the amount of financial aid received in one year and may change from year to year) are the following results for the aggregate financial aid:

a_0		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**-0,949**				
	1995	0,274	-0,409			
	1996	**0,869**	**0,540**	-0,185		
	1997	0,046	0,059	-0,218	-0,248	
	1998		-0,125	-0,335	-0,379	**1,041**
	1999			**0,988**	**1,135**	**1,413**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,810**				
	1995	**0,457**	**0,649**			
	1996	**0,358**	**0,466**	**0,546**		
	1997	**0,360**	**0,385**	**0,417**	**0,391**	
	1998		**0,397**	**0,427**	**0,413**	**0,449**
	1999			**0,170**	0,150	**0,190**

α		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,756**				
	1995	**0,473**	**0,736**			
	1996	**0,436**	**0,676**	**0,751**		
	1997	**0,338**	**0,400**	**0,479**	**0,424**	
	1998		0,184	**0,272**	**0,226**	**1,447**
	1999			0,022	-0,251	**2,829**

β		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,868**				
	1995	**0,993**	**1,045**			
	1996	**1,125**	**1,277**	**1,135**		
	1997	0,536	**0,766**	0,042	-0,137	
	1998		0,233	-0,439	-0,093	0,025
	1999			-0,520	-0,259	0,107

[33] Within different years this group included from 25 up to 50 regions.

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Financial aid	1994	**0,903**				
	1995	**0,554**	**0,829**			
	1996	**0,448**	**0,624**	**0,722**		
	1997	**0,599**	**0,617**	**0,679**	**0,710**	
	1998		**0,739**	**0,800**	**0,798**	**0,725**
	1999			**0,251**	**0,256**	**0,391**

Correspondingly, for additional financial aid received by highly subsidized regions we get the following OLS estimation results:

a_0		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	-0,135				
	1995	-0,130	-0,300			
	1996	-0,176	-0,235	**-0,493**		
	1997	**0,730**	**0,710**	0,295	0,226	
	1998		**0,407**	0,372	**0,552**	**0,431**
	1999			-0,163	0,073	**0,149**

γ		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**0,059**				
	1995	0,062	**0,113**			
	1996	**0,054**	**0,087**	**0,115**		
	1997	0,039	0,048	**0,105**	**0,092**	
	1998		0,046	0,054	0,026	0,012
	1999			**0,058**	0,014	0,032

α		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**1,770**				
	1995	1,770	**1,697**			
	1996	**1,628**	**1,564**	**1,445**		
	1997	3,030	2,413	**1,535**	**2,012**	
	1998		-0,464	0,040	-1,591	13,971
	1999			**1,176**	2,361	1,301

β		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**3,434**				
	1995	4,501	1,501			
	1996	**2,750**	1,625	**1,671**		
	1997	9,635	9,265	**4,134**	1,113	
	1998		3,761	1,860	-4,783	-1,821
	1999			**6,068**	0,967	0,135

adj R^2		Explanatory variables				
		1994	1995	1996	1997	1998
Addional aid	1994	**0,174**				
	1995	**0,198**	**0,204**			
	1996	**0,150**	**0,218**	**0,348**		
	1997	**0,195**	**0,140**	**0,210**	**0,236**	
	1998		**0,054**	**-0,049**	**-0,014**	**0,398**
	1999			**0,625**	**-0,112**	**-0,144**

In general, as it is shown in the tables, the results received for (highly subsidized?) regions differ by a higher coefficients α (more orientated to actual expenditure), β (more orientated to actual revenues) and γ (a larger share of deficit covered). Alongside with that it can be noted that it is in the same manner with α that γ tends to fall within some time as long as β fails to be significant for the earlier years (i.e. financial aid allocation based upon 'normative' values was introduced earlier in these regions than in all the regions). The number of signifi-

cant coefficients for additional financial aid is smaller than for all the regions, i.e. its allocation is less systematized within this regional group than within all the regions. Thus, the hypothesis about common approach (common criteria) taken by the Federal Center to all the regions while allocating financial aid isn't proved by empirical data.

As it was mentioned above, if the formula, by which financial aid is calculated, depends upon regional actual revenues and expenditures, regional authorities possessing enough power can modify own revenues and expenditures relying upon their own priorities and, thus, influencing upon transfer amount. In order to value regional fiscal incentives, that is the impact of financial aid amount on regional revenues and expenditure, the following equations were estimated:

$$T_i = a_0 + a_1 \cdot Tr_i + \varepsilon_i \quad (59)$$

$$E_i = a_0 + a_1 \cdot Tr_i + \varepsilon_i \quad (60)$$

The OLS estimations of (59) for 1994-1999 are given in the tables below (statistically significant coefficients are written in the bold type):

a_0		Financial aid					
		1994	1995	1996	1997	1998	1999
Tax revenues	1994	**5,454**					
	1995	**5,141**	**4,723**				
	1996	**4,907**	**4,623**	**5,117**			
	1997		**4,540**	**4,706**	**4,822**		
	1998			1,150	-0,272	-1,322	
	1999				**3,999**	**3,830**	**3,944**

a_1		Financial aid					
		1994	1995	1996	1997	1998	1999
Tax revenues	1994	**-0,460**					
	1995	**-0,487**	**-0,385**				
	1996	**-0,468**	**-0,448**	**-0,702**			
	1997		**-0,407**	**-0,454**	**-0,501**		
	1998			1,215	**2,031**	**3,884**	
	1999				**-0,635**	**-0,790**	**-1,266**

adj R^2		Financial aid					
		1994	1995	1996	1997	1998	1999
Tax revenues	1994	**0,215**					
	1995	**0,216**	**0,116**				
	1996	**0,214**	**0,174**	**0,267**			
	1997		**0,070**	**0,074**	**0,078**		
	1998			0,036	**0,106**	**0,300**	
	1999				**0,263**	**0,305**	**0,408**

The OLS estimations of equation (60) for 1994-1999 are given in the tables below (statistically significant coefficients are in the bold type):

a_0		Financial aid					
		1994	1995	1996	1997	1998	1999
Expenditures	1994	**7,060**					
	1995	**6,715**	**6,437**				
	1996	**7,336**	**7,154**	**7,001**			
	1997		**7,962**	**7,671**	**7,291**		
	1998			**2,720**	**2,451**	**2,423**	
	1999				**5,151**	**5,216**	**5,225**

a_1		Financial aid					
		1994	1995	1996	1997	1998	1999
Expenditures	1994	**0,687**					
	1995	0,272	**0,547**				
	1996	0,283	**0,501**	**0,547**			
	1997		0,448	**0,565**	**0,759**		
	1998			0,227	**0,372**	**0,570**	
	1999				-0,095	-0,196	-0,158

adj R^2		Financial aid					
		1994	1995	1996	1997	1998	1999
Expenditures	1994	**0,261**					
	1995	0,036	**0,168**				
	1996	0,035	**0,124**	**0,087**			
	1997		0,027	**0,041**	**0,071**		
	1998			0,019	**0,061**	**0,116**	
	1999				-0,009	0,000	-0,010

The estimations of equations (59) and (60) in order to define revenues, expenditures and financial aid amounts characterize (in terms of theoretical model presented above) regional preferences and their initial choice of taxation and expenditure determined by the transfer amount rather than regional behavior depending on change in transfer amount. It also should be noted that such simple regressions of of tax revenues and expenditures upon transfer amount prove to be badly specified. Thus, for shaping tax revenue it is necessary that the equations, which include, besides transfer, tax base and other factors determinant for revenue amount, be used[34]. Analogous assumptions can be made in regard to regional budget expenditures. Here it is advisable that various factors determining expenditure value be considered[35]. In order not to complicate the interpretations of the equations we won't do such estimations at present stage but we'll estimate them as equations of tax revenues and expenditures dependence upon transfer growth year after year. It will give a chance to estimate transfer impact on revenues and expenditures within the assumption that other determinant factors prove to be constant (it is obvious that this assumption is weaker than the one about similar value of corresponding factors in models (59), (60):

[34] see chapter 10 "Structuring Tax Liabilities Dynamics, Regional Fiscal capacity Calculations" in S. Sinelnikov, etc."The Problems of Russian Taxation: theory, experience, reform"

[35] see,e.g., I. Trunin et al. "Elaboration of Budgetary Norms and Methods of Estimation of Inter-regional Differentials in Expenditure Needs in the Russian Federation" in *"Developing Interbudgetary Relations in Russia"*, IET, Moscow, 2000

$$\left(T_i^{t+s} - T_i^{t+s-1}\right) = a_0 + a_1 \cdot \left(Tr_i^t - Tr_i^{t-1}\right) + \varepsilon_i, \text{s} = 0,1,2 \qquad (61)$$

As it was mentioned above, changes in tax revenues opposite in sign to changes in financial aid amount ($a_1<0$) proves to be negative fiscal incentive to provide public goods for a model of such kind (the statistically significant coefficients are given in the bold type).

a_0		Change in financial aid				
		1994-95	1995-96	1996-97	1997-98	1998-99
Ch. in tax rev.	1994-95	**-0,411**				
	1995-96	**-0,284**	**-0,226**			
	1996-97	0,067	0,031	0,008		
	1997-98		-0,610	-0,813	0,517	
	1998-99			-0,220	-1,391	**2,397**

a_1		Change in financial aid				
		1994-95	1995-96	1996-97	1997-98	1998-99
Ch. in tax rev.	1994-95	-0,079				
	1995-96	**-0,163**	**0,208**			
	1996-97	0,072	-0,037	0,191		
	1997-98		-0,820	1,388	2,387	
	1998-99			-1,381	-2,094	**7,255**

adj R^2		Change in financial aid				
		1994-95	1995-96	1996-97	1997-98	1998-99
Ch. in tax rev.	1994-95	-0,001				
	1995-96	**0,055**	**0,050**			
	1996-97	-0,010	-0,013	0,003		
	1997-98		-0,010	0,005	0,029	
	1998-99			0,005	0,020	**0,320**

For most equations estimated (regarding taken lags) financial aid growth doesn't change the tax revenues.

Let's analyze similarequations for impact of financial aid growth upon expenditures increase.

$$\left(E_i^{t+s} - E_i^{t+s-1}\right) = a_0 + a_1 \cdot \left(Tr_i^t - Tr_i^{t-1}\right) + \varepsilon_i, \text{s} = 0,1,2 \qquad (62)$$

The results of the OLS estimations of the regression (62) are given below (significant coefficients are given in the bold type).

a_0		Change in financial aid				
		1994-95	1995-96	1996-97	1997-98	1998-99
Change in exp.	1994-95	**-0,832**				
	1995-96	**0,575**	**0,558**			
	1996-97	**0,783**	**0,753**	**0,687**		
	1997-98		**-5,427**	**-5,512**	**-4,669**	
	1998-99			**1,910**	**1,706**	**2,403**

a_1		Change in financial aid				
		1994-95	1995-96	1996-97	1997-98	1998-99
Change in exp.	1994-95	**0,702**				
	1995-96	-0,118	**0,543**			
	1996-97	0,036	0,037	**1,065**		
	1997-98		-0,385	0,020	**1,520**	
	1998-99			-0,239	-0,335	**1,351**

adj R^2		Change in financial aid				
		1994-95	1995-96	1996-97	1997-98	1998-99
Change in exp.	1994-95	**0,269**				
	1995-96	-0,001	**0,134**			
	1996-97	-0,014	-0,014	**0,123**		
	1997-98		0,002	-0,014	**0,238**	
	1998-99			0,005	0,012	**0,310**

From the estimations performed in order to define the impact of transfer growth on tax revenues and expenditures increase it can be concluded that:

- transfer growth for most equations (regarding the lags) does not exert any influence upon tax revenue increase.

- transfer growth by one unit results in expenditure increase by 0,5 up to 1,5, which depends upon the year (besides, statistically significant dependence can be observed only for the variables within one and the same year).The fact that during some years expenditures increase (or decrease) to a greater degree than financial aid amount does can be explained by several reasons. Firstly, it is possible that expenditure matching on account of tax revenue growth be undertaken (within the years when expenditures growth is larger that transfer increase tax revenue also grows). Secondly, expenditure can be covered by non-tax revenues, which are also changing year after year. Thirdly, regarding the equation like (**61**) and (**62**) we can assume that other factors determinant for expenditures and tax revenues do not change year after year but this assumption may fail to be true. This drawback can be offset by the right specification of the model.

In addition to regression analysis qualitative analysis of changes in transfers impact on regional revenues and expenditures was carried out (see Appendix). This analysis showed that for most of the regions transfer modification results in similar to it in sign expenditure modification, but for a much smaller number of the regions it leads to the opposite tax revenue modification.

As it was demonstrated above, the analysis of lump-sum general grant impact on the choice of the authorities, which turn to be grant-recipients, between public and private goods proves the «leakage» effect of some resources available attained by the increase in regional private goods consumption (tax rate decrease). Alongside with that theoretical analysis of the model shaped proves that financial aid growth always results in tax revenue decrease and expenditure growth, when α value is less than β (financial aid allocation is based upon actual tax revenues rather than actual expenditure value). Besides, if β parameter suffi-

ciently exceeds α along with financial aid growth expenditures decrease attained by substitution effect proves to be possible.

The results of the calculations done in order to define the impact of the transfer growth on expenditures show that theoretical analysis coincide with empirical data. But the analysis of the effect produced by equalizing transfers upon regional tax revenues in the Russian Federation fails to prove any statistically significant dependence.

In order to explain absence of federal financial aid leakage in the private sector in Russia it is possible that the assumptions made about some other empirically given phenomenon such as «flypaper effect» interpreted in the literature on public finance and fiscal federalism be applied. This effect can be characterized by the phrase « Money sticks where it hits."[36] According to this effect the response of lump-sum grant recipient observed while his choosing between public and private goods proves to be different from the response of the voters to income growth on the same territory (e.g. as a result of the decrease in federal taxes paid in this region). This difference is experienced even though both situations (the grant received by the regional authorities and private agents' income growth) prove to be equivalent from the point of view of theoretic analysis. Thus, the investigations of general grant impact (here: block grants) on local public expenditures conducted for the USA show that 100$ grant received by the local government leads to expenditure growth by 40-50$ caused by public goods consumption as long as equivalent private agents' income growth attained by federal tax burden relief on the territory results in local expenditures growth only by 5-10$[37].(37)

In order to explain the situation, when lump-sum grant leads to a larger expenditure growth than it can be expected in theory, it is possible that Niskaken's model for bureaucrats' behavior be made use of[38]. According to this model regional bureaucrats maximize the budget they bear responsibility for as long as it is assumed that their reward, administration power and other benefits are determined by the budget size. Such premise shows that optimum for the bureaucrat budget size (based on average benefits being equal to average costs) will exceed efficiency level achieved by the equality between marginal benefits and marginal costs. If it is assumed that the region proves to be lump-sum grant recipient, then it is in regional bureaucrats' interest to persuade the political authorities of acting

[36] See *Cullis and Jones (1998)*, pp. 321-326
[37] see *Gramlich (1977)*, pp. 282-290.
[38] See *Niskanen (1968)*.

as if it were a categorical specific grant. It results in the authorities' failure to provide tax reduction along with the increase in private goods consumption[39](39), which could be expected if the choice were made according to the representative voter's interests.

Then, the deviation of the results gained by the grant from theoretical assumptions can be explained by fiscal illusion effect[40]. If it is assumed that the population of the region choose the level of public goods production on the basis of «tax price» subjective assessment (the correlation between tax liabilities and public goods provsion supply in the region), then lump-sum grant can be considered by the regional authorities as general increase in regional income. In this case public goods provision level is increasing (by the value dependent upon the elasticity of the demand for public goods with respect to income) as long as the level of taxation is decreasing due to the maintaining of the same tax price (at the same average costs within public goods provision). But it is also possible that regional authorities offer public goods to the population at a new «subsidized» tax price, which causes public goods consumption increase based upon the elasticity of demand for public goods (corresponding to the population needs under the condition of the information being available) according to the price.

Thirdly, it is possible that the effect of the increase in public goods consumption attained by lump-sum grant being more than it could be expected be determined by institutional reasons such as implicit dependence of the grant as well as high transaction costs induced by changes in tax rate (especially if it is expected that revenues growth is temporary and taxes should be increased in the future anyway)[41].

The reasons mentioned above could fail to be sufficient to explain an extremely high expenditure increase attained by transfer to the regions in Russia (average annual expenditures growth is close to 100% of the total sum of federal grants received). Such a profound influence exerted by financial aid upon regional budget expenditures may be caused by some additional reasons. First of all, it should be noted that budgetary system in Russia be characterized by a huge amount of budget debts outstanding to the suppliers of goods and services as well as to social payments recipients. Thus, actual demand for public goods in the regions achieves the level exceeding actual expenditures for public goods provision, which is especially characteristic of the regions greatly in need. Under such

[39] See King (1984).
[40] See *Oates (1979)*
[41] See *Quigley and Smolensky* (1992)

conditions the lump-sum grant proves to be specific (or even matching) for current legislation obligates the regional authorities to provide public goods and grant social transfers to the needy greatly exceeding regional own revenues and financial aid received.

It should also be noted that actual conditions of federal financial support be a bit different from the given model. For instance, while calculating and allocating transfers, the federal authority requires from the regional administration to maximize regional tax rate, to collect tax arrears, to transit budget execution into the federal treasury, etc. Such restrictions provide against grant leakage into the private sector.

It can be also assumed that regional budget expenditures for public goods provision as well as social situation in the region be more important for regional authorities than benefits gained by tax burden relief regarding insignificant tax incidence variation between the regions.

From the analysis of the model of regional authorities' behavior it can be concluded that as long as the weight assigned to actual expenditures less important than 'normative' expenditures (α value decrease) tax revenues should also decrease as well as it can be concluded that the sign of change in expenditures is not defined and depends upon the relationship between the parameters. If fiscal capacity is more important for financial aid allocation procedure than actual tax revenues (β value decrease), tax revenues and actual expenditures prove to be increased.

In order to analyze the impact of..a..and..b.. modification on revenues and expenditure value selected by the regions it is necessary that modification signs of..a.and..b be compared with modification signs of revenues and expenditure within adjacent years. To draw the comparison the regions increasing or decreasing their revenues in 1995-98 should be calculated. The comparison made will regard revenues and expenditures per capita in comparable prices (according to minimal subsistence level). The results of the calculation (in % to the whole number of the regions) are given in the table below:

	Tax revenues					Expenditures				
	1994-95	1995-96	1996-97	1997-98	1998-99	1994-95	1995-96	1996-97	1997-98	1998-99
Share of regions with observed increase	31%	34%	61%	18%	71%	17%	70%	75%	2%	92%

Share of regions with observed decrease	69%	66%	39%	82%	29%	83%	30%	25%	98%	8%

Judging by the results of the estimation done for equation (56) we can arrive at the conclusion that in 1994-98 all the three parameters α, β, γ prove to be falling. Alongside with that there was no common trend in tax revenues and expenditures for partial derivatives of optimal tax and expenditure values with respect to these parameters have different signs and are not defined. For instance, the indefinite sign of tax revenue and expenditure modification is determined by the fact that within simultaneous modification of α and β parameters (as it was shown in the theoretical section) relative dynamics of the latter prove to be more important than their absolute value. And, besides transfer value, revenues and expenditures also depend upon some other factors (expenditure policy parameters, taxation reforms, etc.)[42] Another way to define the influence exerted by the parameters upon tax revenue and expenditure is to perform econometric estimations with respect to panel-data, in which α, β, γ parameters will function as variables explaining either constant or changeable values within a year (e.g. regression (56) residuals given in terms of different α, β, γ. for different regions.)

* * *

Thus, analyzing the results received through empirical verification of the hypotheses about financial aid allocation principles generated in 1994-1999 and the impact of the latter on regional fiscal behavior we can arrive at the following conclusions.

1. Within the given time period the allocation of financial aid from the federal budget was aimed at covering some particular part of the gap range between regional budget revenues and expenditures. The empirical data do not contradict the hypothesis that corresponding gap estimations were done by fiscal authorities on the basis of both actual regional revenues and expenditures and regional fiscal capacity and expenditure needs. As time passed, financial aid allocation procedure grew more dependent upon fiscal capacity and expenditure needs rather than upon actual revenues and expenditures. The econometric estimates, which regard temporal lags, prove that 'normative' value impact on fiscal gap calculations is

[42] Besides, the modification in tax revenue and expenditure value does not only depends upon the parameters of the financial aid formula but also upon the dynamics of regional development economic indexes. (Thus, revenues and expenditure reduction in most regions in1998, if compared to 1997, was largely determined by the autumn financial crisis of 1998.)

getting less considerable as long as the lag between the calculation and financial aid allocation is becoming smaller, which corresponds to actual characteristics of budget procedures.

2. The estimations prove the hypothesis that while allocating financial aid the federal center is orientated to actual tax revenues than actual expenditures. In other way it can be formulated like orientation to expenditure needs rather than to regional budget fiscal capacity. While interpreting such an assumption it is necessary to consider that official transfer allocation methodology up to 1999 was based on the one hand upon actual tax revenues and on the other upon adjusted expenditure values for 1991. Besides, low tax revenues (with low taxing powers of the regionalgovernments) are more determinant for increase in transfer amount than high regional budget expenditures.

3. The empirical data prove the assumption that the criteria, which the aid received from the federal fund of financial assistance for the regions is based upon, be more objective than those used for other kinds of federal financial aid.

4. The hypothesis that federal financial assistance is allocated to all the regions on the basis of common criteria fails to be true. The results of the calculations done within the model for highly subsidized regions are defined by the fact that allocating financial aid to the latter the federal Center compensates for the most part of the deficit and considers actual revenues and expenditure rather than their 'normative' value. The allocation of the additional (to the transfers) financial aid to such regions proves to be less systematized than that to the whole complex of regions.

5. The analysis of the interdependence between changes in tax revenues and in financial aid values does not prove the assumption that regional authorities acquire negative fiscal incentives for the hypothesis that respective coefficient zero-hypothesis of the regression is not rejected. At the same time it is proved that financial aid growth correlates with the expenditures increase for the variables taken regardless the time lags. The qualitative analysis of the data shows that in most cases transfer value growth (decrease) results in expenditure growth (decrease) as long as in some rare cases transfer value growth leads to the opposite in sign change in tax revenue.

6. The empirical analysis failed to prove the hypothesis that modification in financial aid allocation formula (actually the decrease in α, β, γ parameters) correlates with changes in regional tax revenues and expenditures.

APPENDIX 1

The appendix contains the results of tax revenue modification, regional budget expenditure as well as financial aid allocated to the regions in 1994-98.

Shaded cells correspond to tax revenue and expenditure modification coinciding with income effect caused by transfer modification (increase in transfer results in expenditure growth and tax revenue reduction and visa versa).

Region	Federal transfers					Tax revenues					Expenditures				
	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99
Karelya Republic	+	+	+	-	-	-	+	+	+	-	-	+	+	-	+
Komi Republic	-	-	-	-	-	+	-	+	-	+	+	-	+	-	+
Arkhangelskaya oblast	-	-	-	-	+	-	-	+	-	+	+	-	+	-	+
Nenetsky AO	-	+	-	-	+	+	+	+	-	+	-	+	+	-	+
Vogodskaya oblast	-	+	+	-	-	-	-	+	-	+	-	-	+	-	+
Murmansk oblast	-	+	+	-	+	-	-	+	-	+	-	+	+	-	+
City of Saint-Petersburg	-	+	+	-	-	+	+	-	-	+	-	+	-	-	-
Leningradskaya oblast	-	-	+	-	-	+	-	-	-	+	-	+	+	-	+
Novgorodskaya oblast	-	+	+	-	-	-	+	-	-	+	-	+	+	-	+
Pskovskaya oblast	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+
Bryanskaya oblast	+	-	-	-	-	-	-	-	-	+	-	-	-	-	+
Vladimirskaya oblast	-	+	-	-	-	-	-	+	-	+	-	+	-	-	+
Ivanovskaya oblast	+	+	+	-	-	-	-	-	-	+	+	+	+	-	+
Kaluzhskaya oblast	-	+	-	-	-	-	-	+	-	-	-	+	-	-	+
Kostromskaya oblast	+	+	-	-	-	-	-	+	-	+	+	+	+	-	+
City of Moscow	-	-	-	-	-	-	-	+	-	+	-	-	+	-	-
Moscowskaya oblast	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+
Orlovskaya oblast	-	-	+	-	-	-	-	+	+	-	+	-	+	-	+
Ryazanskaya oblast	-	+	+	-	-	-	-	+	+	-	-	+	+	-	+
Smolenskaya oblast	-	+	+	-	-	-	-	+	+	-	-	+	+	-	+
Tverskaya oblast	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+
Tulskaya oblast	-	+	+	-	-	+	-	-	-	+	-	+	+	-	+
Yaroslavsky rayon	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+

Region	Federal transfers					Tax revenues					Expenditures				
	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99
Marii-El Republic	-	-	+	-	+	-	-	-	+	-	-	-	+	-	+
Republic of Mordoviya	+	+	-	-	-	-	-	+	-	+	-	+	+	-	+
Republic of Chuvashiya	-	+	+	-	+	-	+	-	-	+	-	-	+	-	+
Kirovskaya oblast	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+
Nizhegorodskaya oblast	-	+	-	-	-	-	-	+	-	-	-	+	+	-	+
Belgorodskaya oblast	-	+	-	+	-	-	-	-	-	+	-	-	-	-	+
Voronezhskaya oblast	-	+	-	+	-	-	-	-	-	+	-	+	-	-	+
Kurskaya oblast	-	-	+	-	-	-	-	+	-	+	-	+	+	-	+
Lipetskaya oblast	-	-	+	-	-	+	-	-	+	-	+	+	-	-	+
Tambovskaya oblast	-	-	+	-	-	-	-	-	-	+	-	-	+	-	+
Republic of Kalmykiya	-	+	+	-	-	-	+	+	+	-	-	+	+	-	-
Republic of Tatarstan	-	+	-	-	-	+	+	+	-	+	+	+	+	-	+
Astrakhanskaya oblast	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+
Volgogradskaya oblast	-	+	-	+	-	-	-	-	-	+	-	+	-	-	+
Penzenskaya oblast	-	+	-	-	-	-	-	+	-	+	-	-	+	-	+
Samarskaya oblast	-	+	+	+	-	-	+	+	-	+	-	+	+	-	+
Saratovskaya oblast	-	+	+	-	-	-	-	+	-	+	-	+	+	-	+
Ulianovskaya oblast	-	+	-	+	-	-	-	-	-	+	-	-	+	-	+
Republic of Adygeya	-	+	+	+	-	-	-	+	+	-	-	+	+	-	+
Republic of Daghestan	-	-	+	-	+	+	-	+	-	-	-	+	+	-	+
Republic of Ingushetiya	+	-	-	+	-	+	-	+	+	-	+	-	-	-	-
Republic of Kabardni-Balkariya	-	+	+	+	-	+	+	+	-	+	-	+	-	-	+
Rupublic of Karatchaevo-Tcherkessiya	-	+	+	-	-	-	+	+	-	+	-	+	+	-	+
Republic of Northern Osetiya	-	+	+	-	-	-	+	+	-	+	-	+	+	-	+
Republic of Tchetchnya															
Krasnodarsky krai	-	+	+	-	-	-	-	-	-	+	-	+	-	-	+
Stavropolsky krai	-	+	-	-	-	-	-	-	-	-	-	+	-	-	+
Rostovskaya oblast	-	+	-	+	-	-	-	+	-	+	-	+	-	-	+
Republic of Bashkorto-stan	-	+	-	+	-	+	-	+	-	+	+	-	-	-	+

Region	Federal transfers					Tax revenues					Expenditures				
	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99
Republic of Udmurtiya	-	+	+	-	-	+	+	+	-	+	-	+	+	-	+
Kurganskaya oblast	-	+	+	-	-	-	-	+	+	-	-	+	+	-	+
Orenburgskaya oblast	-	+	+	+	-	+	+	+	-	+	-	+	+	-	+
Permskaya oblast	-	+	-	-	-	+	+	+	-	+	+	+	+	-	+
Komi-Permyatsky AO	-	-	+	-	-	+	+	-	+	-	-	-	+	-	+
Sverdlovskaya oblast	-	-	+	-	-	-	+	-	-	+	-	+	-	-	+
Tchelyabinskaya oblast	-	+	+	-	-	+	+	-	-	+	-	+	+	-	+
Republic of Altai	-	-	+	-	-	-	-	+	-	+	-	-	+	-	+
Altaisky krai	-	+	-	-	-	-	-	-	-	+	-	+	+	-	+
Kemerovskaya oblast	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+
Novosibirskaya oblast	-	-	+	-	-	-	-	-	-	+	-	-	+	-	+
Omskaya oblast	-	+	-	-	-	+	-	+	-	+	-	-	+	-	+
Tomskaya oblast	-	+	+	-	-	+	-	-	-	+	-	+	+	-	+
Tyumenskaya oblast	-	+	-	-	-	-	+	-	+	-	-	+	-	-	+
Khanty-Mansiisky AO	-	+	-	+	-	+	+	+	-	+	+	+	+	-	+
Yamalo-Nenetsky AO	-	+	-	+	-	+	+	+	-	+	-	+	+	-	+
Republic of Buryatiya	-	-	+	-	-	-	-	+	-	-	-	-	+	-	+
Republic of Tyva	-	-	+	-	-	-	-	+	+	-	-	-	+	-	+
Republic of Khakassiya	-	-	+	-	-	-	-	-	-	+	-	-	+	-	+
Krasnoyarsky krai	-	-	-	-	+	+	-	-	-	+	+	-	+	-	+
Taimyrsky AO	-	-	-	-	+	+	-	+	-	+	-	+	+	-	+
Evenkiisky AO	-	-	-	-	+	-	+	-	-	+	-	+	+	-	+
Irkutskaya oblast	-	+	+	-	-	-	+	-	-	+	-	-	+	-	+
Ust-Ordynsky Buryatsky AO	-	+	-	+	-	-	+	+	-	+	-	+	-	-	+
Tchitinskaya oblast	-	+	+	-	-	-	+	-	-	+	-	+	+	-	+
Aginsky Buryatsky AO	-	+	-	-	+	-	+	-	-	+	-	+	-	-	+
Republic of Sakha (Yakutiya)	+	-	-	+	н/д	-	-	-	+	н/д	-	+	-	+	н/д
Evreyskaya AO	+	-	+	-	-	-	-	+	-	+	+	-	+	-	+
Tchukotsky AO	+	-	-	-	+	-	+	+	-	-	-	-	+	-	+
Primorsky krai	-	-	-	-	+	-	-	-	-	+	-	-	-	-	+
Khabarovsky krai	-	+	-	-	+	-	+	-	+	+	-	+	-	-	+
Amurskaya oblast	-	+	-	-	+	+	-	-	-	+	+	+	-	-	+
Kamtchatskaya oblast	-	-	+	-	-	+	-	+	-	-	-	-	+	-	-

Region	Federal transfers					Tax revenues					Expenditures				
	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99	1994-95	1995-96	1996-97	1997-98	1997-99
Koryaksky AO	-	-	+	-	-	-	-	+	-	-	-	+	+	-	-
Magadanskaya oblast	-	-	-	-	-	+	+	+	-	+	-	+	+	-	+
Sakhalinskaya oblast	+	+	+	-	-	+	+	+	-	-	-	+	+	-	-
Kaliningradskaya oblast	-	+	+	-	-	-	-	-	-	+	-	+	-	-	+

Literature and references:

AHMAD E., CRAIG J. "Intergovernmental Transfers" // *Fiscal Federalism in Theory and Practice*, ed. by T.Ter-Minassian, IMF: Washington, 1997

AHMAD E., ed. *"Financing Decentralized Expenditures: An International Comparison of Grants"*, Cheltenham, England; Brookfield, Vermont: Edward Elgar, 1997

ATKINSON A., STIGLITZ J. *"Lectures in Public Economics"*, McGraw-Hill, 1980, p. 555

BIRD R.M. *"Federal Finance in Comparative Perspective"*, Toronto: Canadian Tax Foundation, 1986

BLACK D. "On the rationale of group decision-making" // *Journal of Political Economy*, 1948.

BROSIO G. "Fiscal Autonomy of Non-Central Government and the Problem of Public-Spending Growth" // *Public Expenditure and Government Growth*, ed. by F.Forte & A.Peacock, Oxford: Blackwell, 1985, pp.110-135

BUCHANAN, J.M. "An Economic Theory of Clubs" // *Economica*, 32, 125, pp. 1-14

BUCHANAN, J.M. "Federalism and Fiscal Equity" // *American Economic Review*, #40 (4), September, 1950, pp. 583-599

CHERNICK, H.A. "An Economic Model of the Distribution of Project Grants" // P.Mieszkowski and W.H.Oakland (eds.), *"Fiscal Federalism and Grants-in-Aid"*, Washington, D.C.: The Urban Institute, 1979, pp.81-103

CULLIS J., JONES PH. *"Public Finance and Public Choice"*, Oxford University Press, New York, 1998

FISHER, RONALD C. "Income and Grant Effects on Local Expenditure: The Flypaper Effect and Other Difficulties" // *Journal of Urban Economics*, #12, 1982, pp. 324-345

GRAMLICH E.M., GALPER H. "State and Local Fiscal Behaviour and Federal Grant Policy" // *Brookings Papers on Economic Activity*, #1, 1973, pp. 15-58

GRAMLICH, E.M. "Intergovernmental Grants: A Review of the Empirical Literature" // *The Political Economy of Fiscal Federalism*, ed. Wallace E. Oates, Chapter 12, Lexington, MA: D.C. Heath and Company, 1977, pp. 219-239

HOLTZ-EAKIN, D. AND H. ROSEN "Tax Deductibility and Municipal Budget Structure" // *"Fiscal Federalism: Quantitative Studies"*, ed. by H. Rosen, The University of Chicago Press, 1988, pp. 133-134

KING, D. *"Fiscal Tiers: The Economics of Multi-level Government"* // London: Allen & Unwin, 1984
MUSGRAVE R.A., MUSGRAVE P.B. *"Public Finance in Theory and Practice"*, N-Y: McGraw-Hill, 1989, pp. 447-450
MUSGRAVE, R.A. "Approaches to A Fiscal Theory of Political Federalism" // *Public Finances: Needs, Sources and Utilization*, National Bureau of Economic Research, New York, Princeton: Princeton University Press, 1961, pp. 97-122
MUSGRAVE, R.A. *"The Theory of Public Finance: A Study in Public Economy"*, New York: McGraw-Hill, 1959
NETZER, D. "State-local Finance and Intergovernmental Fiscal Relations" // *The Economics of Public Finance*, A.S. Blinder et al., Washington, D.C.: The Brookings Institution, 1974
NISKANEN W.A., *"Bureaucracy and Representative Government"*, New York City, Auldine, Atherton, 1971
NISKANEN, W.A. "The Peculiar Economics of Bureaucracy" // *American Economic Review* (Papers and Proceedings), #57 (2), 1968, pp. 293-321
OATES, W.E. *"Fiscal Federalism"*, New-York: Harcourt Brace Jovanovich, 1972
OATES, W.E. "Lump-Sum Intergovernmental Grants Have Price Effects" // P.Mieszkowski and W.H.Oakland (eds.) *Fiscal Federalism and Grants-in-Aid*, Coupe Papers on Public Economics, Washington, D.C.: Urban Institute, 1979, pp. 22-30
OHLS, J.C., T.J.WALES "Supply and Demand for State and Local Services" // *Review of Economics and Statistics*, #54, 1971, pp. 424-430
QUIGLEY, J.M., SMOLENSKY, E. "Conflicts Among Levels of Government in a Federal System" // *Public Finance/Finances Publiques*, #41, pp. 452-465
ROSEN, H. *"Public Finance"* 5th ed., Irvin/McGraw Hill, 1998
RUBINFELD, D. "The Economics of the Local Public Sector" // *"Handbook of Public Economics"*, ed. by A. Auerbach, North-Holland, 1987, pp. 571-638
SAMUELSON, P.A. "The Pure Theory of Public Expenditures" *// Review of Economics and Statistics*, #36, 387-389. 1954
SCHULTZE, C.L. "Sorting Out the Social Grant Programs: An Economists' Criteria" // *American Economic Review*, Supplement (May, 1974), #64: pp. 181-189
SCOTT, A.D. "The Evaluation of Federal Grants" // *Econometrica*, N.S., #19, 1952, pp. 377-394
SMART, M. *"Taxation Incentives and Deadweight Loss in a System of Intergovernmental Transfers"*, Working paper #UT-ECIPA-MSMART-96-03, Department of Economics, University of Toronto, July 22, 1996

SMITH, D.L. "The Response of State and Local Governments to Federal Grants" // *National Tax Journal*, #21, 1968, pp. 349-357
TANZI V. *"Fiscal Federalism and Decentralization: A Review of Some Efficiency and Macroeconomic Aspects"*, Washington: World Bank, 1995
THUROW, L.C. "The Theory of Grants-in-Aid" // *National Tax Journal*, 1966, #19, pp. 373-377
TIEBOUT C.M. "A Pure Theory of Local Expenditures" // *Journal of Political Economy*, 1956, 64, 5, pp.416-424
WEICHER,J.C. "Aid, Expenditures and Local Government Structure" // *National Tax Journal*, #25, 1972, pp. 573-584
WILDE, J.A. "The expenditure effects of grant-in-aid programs" // *National Tax Journal*, 21, 340-348. 1968
WILDE, J.A. "Grants-in-aid: the analytics of design and response // *National Tax Journal*, #24, 1971, pp. 143-156
WILLIAMS A. "The optimal provision of public goods in a system of local government" // *Journal of Political Economy*, #74, 18-33., 1966
БАТКИБЕКОВ С., П. КАДОЧНИКОВ, О.ЛУГОВОЙ, С. СИНЕЛЬНИКОВ, И.ТРУНИН "Оценка налогового потенциала регионов и распределение финансовой помощи из федерального бюджета" // *Совершенствование межбюджетных отношений в России*. Сборник статей, М., ИЭПП, 2000, Серия "Научные труды" №24Р, стр. 83-237
ДНЕПРОВСКАЯ С., С.СИНЕЛЬНИКОВ, И.ТРУНИН, С.ЧЕТВЕРИКОВ *"Экономические основы межбюджетного выравнивания в Российской Федерации"*, mimeo, Москва: ИЭПП, 2001
ЖУРАВСКАЯ, Е. *"Стимулы к обеспечению общественными благами на местах: бюджетный федерализм по-российски"*, РЕЦЭП, Гарвардский Университет, 25 июля 1998г.