The Use of Modified Input-Output Model for Tax Policy Evaluation: The Russian Case[1]

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First Version: April, 2011

Abstract

The first purpose of this paper is to present a new approach, which develops a standard Input-Output model. The main emphasis is on the problem of householder’s consumption. Within the IO framework, a model, formally similar to the Keynesian multiplier, is proposed to construct the matrix of technology of consumption (MTC). The second purpose of this article is to demonstrate the application of MTC to the tax policy evaluation in Russia.

Key words: Input-Output model, Keynesian multiplier, technology of consumption, tax policy, Russia

1. Introduction

The aim of this paper is to show a new approach for analysis and forecasting taxes which deals with the distribution of household`s income between other sectors. What we propose here is an alternative, complementary way to compute sector tax multipliers.

The paper is organized as follows. Tax policy and tax forecasting problems in Russia are presented in Section 2. Section 3 contains an introduction to modified Input-Output model, which based on Keynesian theory of multiplier and classic IO model. Some differences between Leontiev method and new approach are described. The formal structure of new model is described in Section 4. We show how to construct a new conceptual framework. The main empirical results are reported in Section 5. This part of paper provides comparison between numerical results following

[1] Support from research grant of Russian Humanitarian Scientific Fond № 10-02-62206a/T is gratefully acknowledged.

both calculations: those derived from modified Input-Output model with those of the standard implementation of the IO method. Finally, Section 6 presents some concluding remarks.

2. Tax policy and tax forecasting problems in Russia

The modern tax system of Russia was created in 1991 with acceptance of some bills and changed the Soviet practice of an establishment of payments from the profit of the enterprises to the budget.

Unlike the majority of the advanced countries the basic part of tax proceeds in Russian federal budget (about 60 %) is provided with indirect taxes. The share of VAT (value added tax) in 2010 was 50.29 % of the federal budget revenues. The corporate profit tax has provided only 9.20 % of tax proceeds, but revenue from mineral extraction tax was 16.58 %.

As a whole Russian tax system was formed in conditions of slump in production and inflation and characterized in 1990th by a plenty of tax remissions, high base rates, low tax receipts, irresponsibility of tax bearers and other problems.

The serious problem in Russia is tax evasion. Concealment of taxes in Russia (Zhuravlyeva 2003) achieved 49,3 %, distortion of payroll - 50,4 %, concealment and understating of the profit - 34,8 %, the not accounted total added value - 42,8 %. All these components form significant sphere of a shadow economy (about 40-45% of gross domestic product (GPD)), existing in Russia with legal economy.

Therefore one of key ideas of the tax reform realizing since 2000 is decrease of tax rates which lead to reduction of gap between nominal and actual tax screw. The rate of the tax on profit was decreased from 35 % to 20 %, the rate of income tax was cut from 30 % to 13 %, the rate of VAT was reduced in comparison with the beginning of 1990th from 28 % to 18 %. Besides in order to align the conditions of the taxation in 2002 the majority of tax remissions was cancelled.

The tax reform resulted in sharp decrease of tax screw in Russian economy. If in the beginning of 1990th it exceeded 60 % of GDP by 2010 it was decreased to 32.4 %.

The sharp changes of tax policy define a necessity of tax forecasting. The tax forecasting, realized in Russia, is based on extrapolation of actual values of tax revenues of the budget for a current year for the scheduled period, i.e. the analysis of time numbers is used (Belyakov (2003), Yandiev (2001)). Thus changes of the time numbers, which have appeared as the result of change of tax structure, the tax laws or other reasons, are taken into consideration by the expert analysis.

The majority of tax forecasting techniques used in the Russian practice have serious lacks. First, the given techniques have short-term and intermediate term character of forecasting and can not be used with a high degree of definiteness for the period more than 1 year. At the same time consequences of change of the tax laws completely can be completely shown only after long time. Second, traditional ways of tax forecasting are based on the analysis of time numbers. In our opinion, the horizontal analysis of macroeconomic parameters even with the use of leveling factors (a consumer prices index, an inflationary component etc.) is inexpedient in the modern Russian conditions described by a high degree of uncertainty. Thirdly, existing techniques of tax forecasting don't take into account intersector links in economy.

The decision of the above-stated problems of tax forecasting in Russia is its formation within the framework of a complex of macroeconomic forecasts. In our opinion, it is expedient to use at tax forecasting various models based on the Input-Output (IO) method.

The use of the IO tables and tools of various multiplier concepts allows to estimate a real tax screw of separate sectors with taking into consideration branch features of the taxation. Besides the IO analysis, using technological factors of intermediate consumption, structure of employment and household consumption, parameters of import/export, influence of the government expenditures, allows to calculate tax effects from change of above named factors.

At last, the use of multiplier models solves long-term problems of tax forecasting: an estimation of forthcoming changes in the tax laws, a basis for decisions on the government support of those or other sectors, application of tax remissions etc.

3. Technology of Consumption

One of the main differences the modified IO model from standard IO method is distribution of income from primary factors to several groups of households. New approach gives an opportunity to consider household's consumption as matrix, not a vector as in standard Leontiew's framework.

Define as **C = (Cir)** matrix of household's consumption, where **i** is an index of industry, which produced commodity, **r** is an index of household's group (Dondokov 2000 a). This matrix describes a structure of household's consumption. Let us name this matrix as «consumption matrix».

In our approach we offer new household classification based on industry, in which household receive income (salary, profit, percent and so on). So the consumption matrix may be defined as a «technology of consumption» **C = (Cij)**, where **j** is index of industry which uses production of industry **i**. The structure of the matrix **C** is analogous with the structure of the technological matrix **A**, so define coefficient **cij = Cij/Xj** as direct consumption coefficient.

It is easy to construct the matrix **C,** if we suppose:

1. all employed peoples receive income in one branch;
2. all members of household work in one branch;
3. households receive income from primary factors, but not receive any transfers (pensions, relief and so on)

Consider, for example, economics, which consists from 2 branches - agriculture and manufacturing. Having this assumption, we may consider, for example, coefficients **C_{12}** as the total sum of manufacturing's consumption of the workers (households) which employed (receive income) in agriculture.

The next stage of our analysis is to adopt real data to new approach. Let us consider a household which members have different sources of income. For example, first member works in both branches and receives 1250 dollars in agriculture and 1750 dollars in manufacturing. The second member receives 2000 dollars from manufacturing. The total income of this family is 5000 dollars. Suppose that for this household a structure of expenditures (technology of consumption) is follows: 30 % of total income is expenditures for agriculture products, 50 % - expenditures for manufacturing productions, 20 % are savings and taxes. The total income received from manufacturing is 3750 dollars and 3000 dollars from this sum used for consumption. The income received from agriculture is 1250 dollars and 1000 dollars from this sum used for consumption. So we may construct matrix **MC** for this household using it's technology of consumption: $\mathbf{C}_{11} = 375$**;** $\mathbf{C}_{21} = 625$; $\mathbf{C}_{12} = 1125$**;** $\mathbf{C}_{22} = 1875$. Using this procedure to another households we obtain the total matrix **C** by addition all separate matrixes of household's consumption **C**.

4. **The Formal Structure of the Model**

Let us start by considering a standard IO model, which can be written in scalar form as follows:

$$\mathbf{\overline{A} + W = X = \overline{A} + Y,} \tag{1}$$

where $\mathbf{\overline{A}}$ is a total sum of intermediate products, **W** is a total sum of added value (the total income), **Y** is a total final demand, **X** is a gross output. The left side of the equation (1) is a total supply and the right part shows a total demand.

We rewrite the equation (1) as follows:

$$\mathbf{X = \bar{A}d + \bar{A}z + R + \check{T},} \tag{2}$$

where $\mathbf{\bar{A}d}$ is total sum of domestic intermediate products, $\mathbf{\bar{A}z}$ is total sum of import intermediate products, **R** is total sum of added value besides taxes, $\mathbf{\check{T}}$ is total sum of taxes.

Let us defined $\mathbf{\Delta T}$, $\mathbf{\Delta Y}$, **t**, $\mathbf{\bar{a}d}$,

where $\mathbf{\Delta T}$ is gain of taxes, $\mathbf{\Delta Y}$ is gain of total final demand, $\mathbf{t = \check{T}/X}$, $\mathbf{ad = \bar{A}d/X}$, $\mathbf{az = \bar{A}z/X}$,

The tax multiplier model is showed in Figure 1.

$$\mathbf{\Delta T = t^*\Delta Y + t^*\bar{a}_d\ ^*\Delta Y + t^*\bar{a}_d{}^*\bar{a}_d\ ^*\Delta Y + \ldots..} \tag{3}$$

Then we have:

$$\mathbf{\Delta T = t\ ^*\Delta Y^*(1 - \bar{a}_d)^{-1}} \tag{4}$$

Let us consider matrix analogue of the specified tax multiplier.

The Leontiew's inverse matrix $\mathbf{(E\text{-}Ad)^{-1}}$ is the matrix multiplier of gross output, where **Ad** is an (n*n) matrix of domestic direct input coefficients. This multiplier shows the total growth of gross output, connected with the increasing of total final demand.

Let us introduce vector $\underline{\mathbf{T}}$ **=** $(\underline{\mathbf{T}}\mathbf{j})$**,** where $\underline{\mathbf{T}}\mathbf{j}$ is a sum of taxes, which are generated by sector **j**:

$$\underline{T}j = T1j + T2j + T3j + T4j + T5j + T6j, \quad (5)$$

where **T1j** is the social security tax (the united social tax), **T2j** is the income tax; **T3j** is the corporate profit tax, **T4j** is the personal income tax, **T5j** is other production duties, **T6j** is other taxes to products.

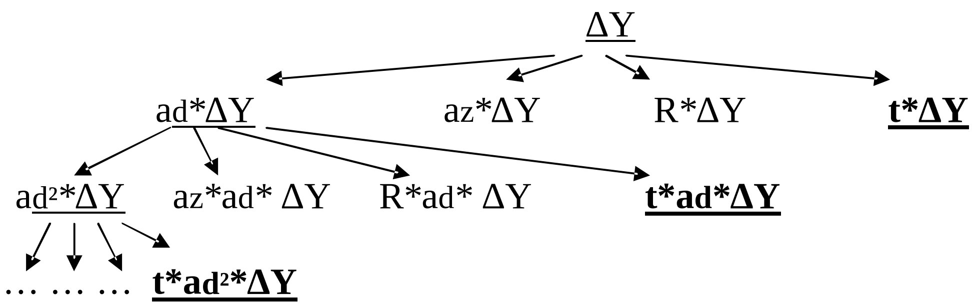

Figure 1. The Tax Multiplier Scheme

Let us introduce vector **T = (Tj)**, where **Tj** is a share of taxes in gross output of sector **j**:

$$Tj = \underline{T}j/Xj$$

The final formula of calculating sector tax multiplier **Tm** is given by:

$$Tm = T^*(E\text{-}Ad)^{-1} \quad (6)$$

This sector tax multiplier has some shortcomings because the vector **Tm** is not shows whole tax multiplier effects.

Let us suppose that the total income **W** is equal a sum of expenditures: the household consumption, the household saving and the total sum of taxes. So we can consider the following equation of general equilibrium based on equation (1):

$$A + C + S + T = X = \bar{A} + C + I + G. \quad (7)$$

The matrix form of equation (7) is described as follows:

$$\sum_i Aij + \sum_I Cij + Sj + Tj = \sum_j Aij + \sum_j Cij + Ii + Gi, \quad \text{if } i = j \quad (8)$$

The left side of the equation (8) is a total supply of industry **j** and the right part shows a total demand.

It is not differences for producer - who is a consumer of the product - enterprise or household. For example, the sugar's plant sells sugar to the confection's factory and to member of household, which is employed in this factory. If we sum productive and non-productive consumption of some commodities, we may receive the total value of expenditures of this product **$D_{ij}=A_{ij}+C_{ij}$** (sugar and so on). So we consider both household consumption and productive expenditures as endogenous parameters.

Let us introduce new form of matrix multiplier **M**: (see Dondokov, 2000 b)

$$M = (E-D)^{-1}, \quad (9)$$

where **$D=(\underline{d_{ij}})$, $\underline{d_{ij}}=D_{ij}/X_j$**.

This multiplier gives an opportunity to calculate whole multiplier effects. For example, if aircraft plant will produce and sell additional airplane for export, its workers will receive additional income, so they will buy more commodities and so on. The standard IO model can not gives this opportunity.

Let us consider open economics, so the equation of general equilibrium may be written as system of two equations:

$$\sum_j A_{dij} + \sum_j A_{zij} + \sum_j C_{dij} + \sum_j C_{zij} + G_i + I_i + (V_i - M_i) = X_i, \quad (10)$$

$$\sum_i A_{dij} + \sum_i A_{zij} + \sum_i C_{dij} + \sum_i C_{zij} + S_j + T_j = X_j, \quad (11)$$

where **V_i** is an export of industry **i** and **M_i** is an import of industry **i**, coefficients **A_{dij}** and **A_{zij}** are domestic and import direct inputs, **C_{dij}** and **C_{zij}** are domestic and import direct consumption's expenditures. It is obviously that the sum of domestic and import indexes is equal the total index:

$$A_{dij} + A_{zij} = A_{ij}. \quad (12)$$

$$C_{dij} + C_{zij} = C_{ij}. \quad (13)$$

Define **$A_{dij}+C_{dij}$** = **D_{rij}**, matrix **$A_d = (\underline{a_{dij}})$** is the domestic direct input matrix, **$C_d = (\underline{c_{dij}})$** is the domestic direct consumption matrix, where **$\underline{a_{dij}}=A_{dij}/X_j$**, **$\underline{c_{dij}}=C_{dij}/X_j$**. Let us name matrix **D** = (**D_{rij}**) as **matrix of total inputs (matrix of total expenditures)**.

The matrix multiplier **M_r** is described as follows:

$$M_r = (E-D_r)^{-1} = (E-(A_d+C_d))^{-1}, \quad (14)$$

where **$D_r = (\underline{d_{rij}})$, $\underline{d_{ij}}=D_{rij}/X_j$**

Let us name the multiplier **M_r** as **multiplier of total expenditures**. It shows the growth of gross domestic product connected with the growth of exogenous parameters (total sum of investments, government expenditures and net export).

The scalar analogue of the specified tax multiplier is shown in Figure 2.

$$\Delta T = t*Y + t*\bar{a}_d *\Delta Y + \hat{c}_d*Y + t*\bar{a}_d^2*\Delta Y + t* \hat{c}_d *\bar{a}_d*\Delta Y + t*\bar{a}_d*\hat{c}_d*\Delta Y + t*\hat{c}_d^2*\Delta Y + \ldots \quad (15)$$

Then we have:

$$\Delta T = t *\Delta Y*(1- (\bar{a}_d+ \hat{c}_d))^{-1} \quad (16)$$

The final formula of calculating sector tax multiplier **T_r** is given by:

Tr = T* Mr (17)

This multiplier **Tr** gives answer to the question: how to calculate growth of taxes connected with the growth of exogenous parameters.

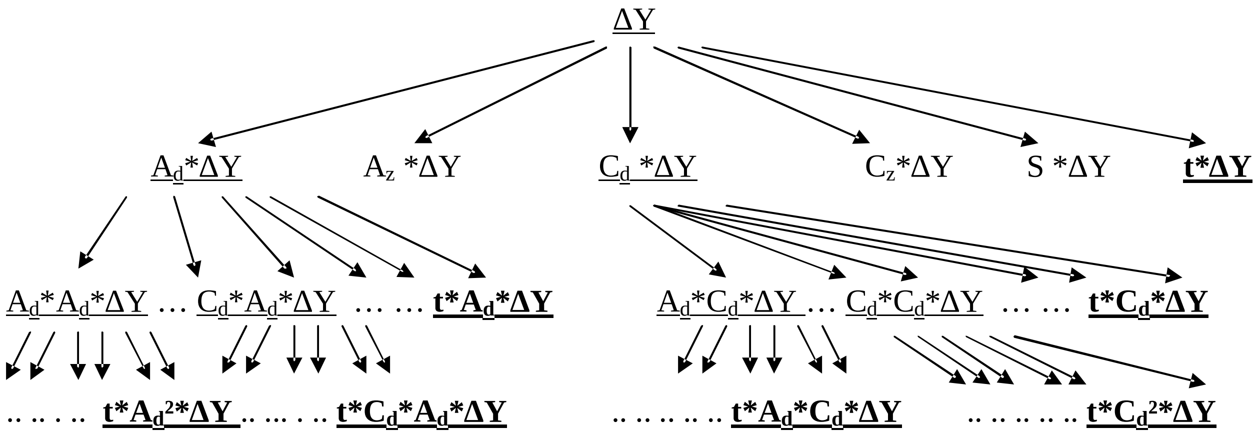

Figure 2. The Modified Tax Multiplier Scheme

This multiplier is a good tool in analysis of import leakage. The standard IO model or SAM can not provide this opportunity to evaluate this kind of leakage - total industry's leakage. For example, if sugar in our example is import product, then both confection's factory (coefficient a_{zij}) and household (coefficient c_{zij}), not only enterprise, contribute to import's growth.

5. The Empirical Results

The model considered in this paper is shown in the calculations which based on 22-sectors IO tables of Russian economy for 1995, 1997, 2000 (The IO tables of Russia for 1996-1997, The IO tables of Russia for 2000).

First of all direct tax screws of sectors were calculated according to the tax rates working for year of construction of IO table. Direct tax screw is calculated by summation of primary groups of taxes and division of this sum into gross output of the given branch according to equation (5).

The calculations were made with allowance for the following points:

1. The tax screw consists of tax revenues, and incomes of the unappropriated funds which make almost half of the consolidated budget's incomes. According to methodology of the standard national accounting obligatory payments of employers on social insurance are included in «The wage» of the IO table. Therefore social deductions are calculated under the settlement rate from the wagebill. The total social deductions of employers averaged 39,5% of the wagebill. The base rate of the unitedsocial tax was reduced up to 35,6% in 2001.

2. The VAT, excises, the customs make section «The clean taxes to products» of the IO table and represent the absolute value depending on gross output, a share of the appropriate tax in total

and its tax rate. Similarly in the aggregated form «Other production duties» consisting of wealth taxes, the land charges and other resource payments are submitted in the IO table.

3. The income tax had a progressive scale with the base rate of 12%, but since 01.01.2001 it began to be estimated from the wages fund "cleared" off social payments under the united rate of 13%.

The results of calculations of tax screw of Russian economy's sectors in 1995, 1997, 2000 are presented in Table 1.

Table 1. Direct tax screws for Russia, % of gross output,

	In the current rates			In rates of 2004			Δ		
	1995	1997	2000	1995	1997	2000	1995	1997	2000
1. Electricity	34,80	47,03	21,33	33,32	44,20	18,75	1,48	2,84	2,58
2. Petroleum and natural gas	21,21	37,69	21,51	20,57	35,20	19,21	0,64	2,50	2,30
3. Coal	12,59	25,92	20,25	11,61	23,97	18,64	0,97	1,95	1,61
4. Other mining	8,81	39,62	31,34	7,64	37,64	28,99	1,17	1,98	2,35
5. Iron and Steel	16,52	30,01	13,53	15,39	28,37	11,54	1,12	1,64	1,99
6. Non-ferrous metals	20,13	24,60	15,28	18,83	22,75	13,44	1,30	1,85	1,84
7. Chemical	18,90	26,61	13,94	17,68	24,98	12,08	1,22	1,64	1,86
8. Machinery	25,72	25,98	13,45	24,50	24,47	12,00	1,22	1,52	1,45
9. Wood products	21,44	29,02	15,56	20,55	27,41	13,68	0,89	1,61	1,88
10. Construction materials	17,44	36,22	16,21	16,74	34,20	14,52	0,70	2,02	1,70
11. Closing and Leather	17,67	24,78	12,01	16,97	24,01	11,07	0,70	0,77	0,94
12. Food industry	19,67	22,05	9,84	19,00	20,56	8,65	0,67	1,49	1,18
13. Other manufactures	19,55	24,66	13,24	18,29	23,03	11,72	1,26	1,63	1,52
14. Construction	32,57	35,01	16,83	31,07	32,96	14,83	1,50	2,05	2,00
15. Agriculture	24,27	17,39	7,46	23,68	16,72	6,65	0,58	0,67	0,81
16. Transport and Communication	36,42	36,10	21,62	35,04	33,06	19,12	1,38	3,05	2,50
17. Commercial services	27,19	28,42	19,89	25,33	24,53	15,94	1,86	3,89	3,95
18. Other productive services	27,65	30,28	20,31	25,42	26,87	18,05	2,23	3,41	2,26
19. Education, medicine and culture	36,16	28,08	20,35	35,05	25,72	18,61	1,10	2,35	1,74
20. Dwelling services	24,53	31,52	19,54	23,53	28,72	17,86	1,00	2,80	1,68
21. Government and finance.	30,34	27,20	18,03	27,14	25,68	16,63	3,20	1,51	1,40
22. Science	45,30	25,21	18,38	44,38	23,87	17,10	0,92	1,34	1,28
Average	24,49	29,70	17,27	23,26	27,68	15,41	1,23	2,02	1,86
Max	45,30	47,03	31,34	44,38	44,20	28,99	3,20	3,89	3,95
Min	8,81	17,39	7,46	7,64	16,72	6,65	0,58	0,67	0,81

As a whole it is impossible to speak about any tendency of change of average tax loading as in 1997 there was its growth in comparison with a level of 1995 on 5,21 p.p., and 2000 was characterized by sharp reduce tax loading to a level of 17,27 %.

The dynamics of tax loading of separate sectors is following: in 1995 the science, transport and communication, education (their screws are 45,30%, 36,42%, 36,6% accordingly) were the most burdened with taxes, in 1997 on the general increase of tax loading of economy and in 2000 on its general decrease leaders of direct tax effect were other mining (in 1997 -39,62 %, in 2000 -31,34 %), petroleum and natural gas (37,69 % and 21,51 %), electricity (47,03 % and 21,33 %). On the contrary, the following sectors have lowered a rank in the list of sectors' tax loadings:

machinery (in 1995 – the 9th point, in 2000 – the 18th point), closing (18 and 20), food industry (15 and 21), construction (5 and 12), agriculture (11 and 22) and government and finance (6 and 11).

In the analyzed period the sector which is the least burdened with taxes is agriculture. The share of taxes in gross output was 17,39% in 1997, 7,76 % in 2000 on the negative profit and rather low value of the total income.

As a whole tax loading depends on the level of tax rates and structure of total added value. Substituting modern tax rates (the united social tax – 35,6%, the income tax – 13%, VAT – 18%, the tax on profit – 24%), we have opportunity to define hypothetical tax loading of economy with former volumes and proportions of gross output. So, the difference for the benefit of modern tax rates is from 3,95% of gross output (commercial services in 2000) up to 0,58 % (agriculture in 1995). Absence of negative results means, that as a whole it would be more profitable for all sectors to function in modern system of tax rates.

Having calculated values of direct tax screws, it is possible to start directly tax forecasting taking into account multiplier effects.

Two series of calculations were carried out in 1995, 1997 and 2000 according to the standard IO method and the modified model. The first series of calculations assumes the current tax rates. The second series of calculations assumes the modern tax rates during the given period.

The direct tax screws shown in column 3-5 of Tables 1 are used in the first series. Using the data of IO table of Russia for the appropriate year and applying standard methods of IO and statistic analysis, we obtain the $\Delta T/\Delta Y$ for each sector of economy. The results of calculations are shown in Table 2.

As a whole the results of the first series of calculations testify of the significant excess of indirect tax effects of the sectors in comparison with their direct tax screws. On the average the multiplier effects appreciated by IO method, exceeded direct tax screw on 122,17 % in 1995 (on 69,68% in 1997, on 97,15% in 2000).

Besides Table 2 show exceeding sizes of $m2$ above $m1$. On the average this excess in 1995 is 55,41%, in 1997 - 29,15%, in 2000 - 38,05%. Thus maximum excess $m2$ above $м1$ in the considered period was in science in 1995, in other mining in 1997, in agriculture in 2000.

As for separate sectors the greatest excess $m2$ above $м1$, for example in 2000, is traced in agriculture (76,33%), commercial services (51,57%), food industry (47,67%), i.e. in those sectors where the significant share of output is household consumption. The household consumption of the domestic goods is taken into account in the concept of total expenditures and it makes the multiplier mechanism much wider.

Table 2. The sector tax multipliers, Russia

	1995			1997			2000		
	м1[1]	м2[2]	м2/м1	м1	м2	м2/м1	м1	м2	м2/м1
1. Electricity	0,609	0,842	1,383	0,621	0,742	1,195	0,411	0,541	1,316
2. Petroleum and natural gas	0,551	0,808	1,466	0,602	0,725	1,204	0,410	0,529	1,290
3. Coal	0,464	0,770	1,659	0,468	0,619	1,323	0,345	0,470	1,362
4. Other mining	0,406	0,738	1,818	0,560	0,694	1,239	0,414	0,535	1,292
5. Iron and Steel	0,471	0,744	1,580	0,549	0,666	1,213	0,309	0,429	1,388
6. Non-ferrous metals	0,473	0,749	1,584	0,491	0,623	1,269	0,331	0,449	1,356
7. Chemical	0,478	0,730	1,527	0,543	0,667	1,228	0,322	0,438	1,360
8. Machinery	0,483	0,728	1,507	0,488	0,617	1,264	0,310	0,430	1,387
9. Wood products	0,504	0,774	1,536	0,530	0,665	1,255	0,337	0,464	1,377
10. Construction materials	0,506	0,777	1,536	0,578	0,706	1,221	0,365	0,491	1,345
11. Closing and Leather	0,290	0,463	1,597	0,423	0,537	1,270	0,238	0,323	1,357
12. Food industry	0,418	0,635	1,519	0,449	0,586	1,305	0,251	0,371	1,478
13. Other manufactures	0,438	0,714	1,630	0,471	0,610	1,295	0,310	0,431	1,390
14. Construction	0,521	0,794	1,524	0,512	0,646	1,262	0,319	0,445	1,395
15. Agriculture	0,480	0,747	1,556	0,362	0,521	1,439	0,184	0,325	1,766
16. Transport and Communication	0,544	0,809	1,487	0,495	0,647	1,307	0,339	0,469	1,383
17. Commercial services	0,416	0,735	1,767	0,390	0,565	1,449	0,278	0,421	1,514
18. Other productive services	0,448	0,786	1,754	0,431	0,598	1,387	0,302	0,338	1,119
19. Education, medicine and culture	0,571	0,831	1,455	0,441	0,600	1,361	0,334	0,466	1,395
20. Dwelling services	0,557	0,824	1,479	0,497	0,648	1,304	0,359	0,492	1,370
21. Government and finance.	0,508	0,799	1,573	0,462	0,611	1,323	0,330	0,456	1,382
22. Science	0,732	0,916	1,251	0,456	0,595	1,305	0,373	0,503	1,349
Average	0,494	0,760	1,554	0,492	0,631	1,292	0,326	0,446	1,381
Max	0,732	0,916	1,818	0,621	0,742	1,449	0,414	0,541	1,766
Min	0,290	0,463	1,251	0,362	0,521	1,195	0,184	0,323	1,119

[1]м1 is sector tax multiplier according to the standard IO method, [2]м2 is sector tax multiplier according to the concept of total expenditures.

Direct tax screws shown in Column 6-8 of Table 1 are used for the second series of calculations. The received values of ΔT/ΔY are presented in Table 3.

Comparing results of Table 3 with results of the first series of calculations, displacement of ΔT /ΔX aside of the decrease connected with the lower level of direct tax screw takes place.

The high value of м1 is obtained in science in 1995 - 0,712, the lowest in agriculture in 2000 - 0,164. The value of m2 is 0,888 for science of 1995 and 0,289 for agriculture of 2000. As a whole differentiation of values of m2 in separate sectors is narrower than at м1, i.e. some sectors, in particular, whose goods are used by households, have the big tax potential and can compete with sectors which are initially considered as the most effective for taxation.

Table 3. The sector tax multipliers in tax rates of 2004, Russia

	1995			1997			2000		
	м1	м2	м2/м1	м1	м2	м2/м1	м1	м2	м2/м1
1. Electricity	0,582	0,804	1,381	0,582	0,695	1,194	0,363	0,479	1,320
2. Petroleum and natural gas	0,527	0,772	1,465	0,562	0,676	1,203	0,366	0,472	1,290
3. Coal	0,437	0,730	1,670	0,435	0,575	1,322	0,313	0,424	1,355
4. Other mining	0,380	0,697	1,834	0,530	0,655	1,236	0,380	0,486	1,279
5. Iron and Steel	0,443	0,704	1,589	0,517	0,625	1,209	0,269	0,375	1,394
6. Non-ferrous metals	0,445	0,708	1,591	0,456	0,579	1,270	0,291	0,396	1,361
7. Chemical	0,451	0,691	1,532	0,509	0,624	1,226	0,282	0,385	1,365
8. Machinery	0,459	0,692	1,508	0,459	0,578	1,259	0,275	0,381	1,385
9. Wood products	0,481	0,739	1,536	0,499	0,625	1,253	0,297	0,409	1,377
10. Construction materials	0,484	0,742	1,533	0,544	0,663	1,219	0,325	0,437	1,345
11. Closing and Leather	0,276	0,441	1,598	0,407	0,512	1,258	0,216	0,292	1,352
12. Food industry	0,399	0,607	1,521	0,421	0,549	1,304	0,222	0,328	1,477
13. Other manufactures	0,414	0,677	1,635	0,441	0,571	1,295	0,274	0,381	1,391
14. Construction	0,497	0,757	1,523	0,481	0,606	1,260	0,282	0,394	1,397
15. Agriculture	0,464	0,719	1,550	0,345	0,492	1,426	0,164	0,289	1,762
16. Transport and Communication	0,521	0,775	1,488	0,455	0,597	1,312	0,300	0,415	1,383
17. Commercial services	0,390	0,695	1,782	0,343	0,506	1,475	0,229	0,356	1,555
18. Other productive services	0,416	0,739	1,776	0,388	0,543	1,399	0,268	0,300	1,119
19. Education, medicine and culture	0,550	0,798	1,451	0,407	0,555	1,364	0,301	0,419	1,392
20. Dwelling services	0,533	0,788	1,478	0,458	0,598	1,306	0,324	0,442	1,364
21. Government and finance.	0,466	0,744	1,597	0,434	0,572	1,318	0,299	0,412	1,378
22. Science	0,712	0,888	1,247	0,430	0,559	1,300	0,341	0,456	1,337
Average	0,469	0,723	1,558	0,459	0,589	1,291	0,290	0,397	1,381
Max	0,712	0,888	1,834	0,582	0,695	1,475	0,380	0,486	1,762
Min	0,276	0,441	1,247	0,343	0,492	1,194	0,164	0,289	1,119

6. Concluding Remarks

In this paper we have offered the approach which allows to estimate tax receipts with taking into account household consumption. Using this method we have also presented some numerical results that can be contrasted with those derived from the standard IO multipliers. The difference of the numerical results supports the view that the proposed accounting procedure allows to carry out more exact calculations for an estimation of the sector tax multipliers. We hope our proposal here, which is a formal extension of the IO method, can contribute to a wider knowledge of these computation techniques.

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