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Tax Policy Measures for Education and Healthcare Sectors of Russian Economy: Computable General Equilibrium Analysis
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Besstremyannaya G.E., Bakhtizin A.R. Tax Policy Measures for Education and Healthcare Sectors of Russian Economy: Computable General Equilibrium Analysis. / Working paper # WP/2006/208. – Moscow, CEMI Russian Academy of Sciences, 2006. (Eng.)

The paper contrasts the impact of the two tax policy measures: unified social tax decrease and combination of unified social tax decrease and personal income tax increase against institutional reduction in the rules for informal activity.

The estimations are implemented with the help of dynamic computable general equilibrium model of Russian economy calibrated on the base National accounts data. The CGE model "Social Russia" includes labor, health care and education, and allows analyzing the relations between state fiscal policy and household behavior. It uses the system of state and market prices which can give a description of state guarantees and market relations in Russian economy and in particular, in healthcare and education.

Computational simulations in the model prolonged for several years demonstrate that institutional changes in informal activity lead to more favorable effect on production and labor transparency than does reduction in unified social tax rate. (Eng.)

Бесстремянная Г.Е., Бахтизин А.Р. Меры налоговой политики для отраслей образования и здравоохранения России: анализ с помощью вычислимой модели общего равновесия. / Препринт # WP/2006/208 – М. ЦЭМИ РАН, 2006. (Eng.)

Возможные последствия двух мер налоговой политики - снижения ставки единого социального налога и одновременное с этим повышение ставки подоходного налога – сопоставлены с изменениями в институциональных правилах формирования теневого сектора экономики России.

Расчеты осуществляются с помощью вычислимой модели общего равновесия российской экономики, откалиброванной по данным государственной статистики. Вычислимая модель «Социальная Россия» включает рынки труда, услуг здравоохранения и образования и позволяет анализировать взаимосвязи между мерами государственной фискальной политики и поведением домохозяйств. В модели используется система государственных и рыночных цен, что делает возможным описание государственных гарантий и рыночных отношений в экономике в целом и, в особенности, в отраслях здравоохранения и образования.

Вычислительные эксперименты, осуществленные на временном горизонте в течение нескольких лет, показывают, что институциональные изменения в теневом секторе приводят к более благоприятному эффекту в сфере производства и занятости, чем снижение единого социального налога.

CONTENTS

1. Introduction

This research proposes applying Computable General Equilibrium (CGE) modeling for analyzing economic processes in the two social sectors: healthcare and education. The paper presents the model "Social Russia" - the modification of the first detailed CGE model for Russian economy (RUSEC), developed in the Central Economics and Mathematics Institute under the supervision of V. Makarov. RUSEC (*RUS*sian *EC*onomy) allows to model economic system overcoming most problems of CGE modeling in transition economies. The model has a short time horizon - input data are monthly statistics.

RUSEC is dynamic and based on a combination of calibration and econometric approaches. In fact, the model is a macroeconomic multi-agent description of economic mechanism. Theses features may be regarded as justification of its applicability for Russian economy.

"Social Russia" includes labor, health care and education, and allows analyzing the relations between state fiscal policy and household behavior. The model uses the system of state and market prices which can give a description of state guarantees and market relations in Russian economy and in particular, in healthcare and education. The model serves as economics and mathematics apparatus to assess the tax policy measures and the informal sector activity in the overall Russian economy and the chosen social sectors.

Although System of National Accounts may not be always able to capture micro economic principles of assessing the real value of many economic indicators, (e.g. the securities market, Utsunomiya, 2003), it has become of the major instruments for giving the largest sketch of national economy. One of the earliest attempts to employ the Russian National statistics as described in the multi-sector accounts and construct balanced Social Accounting Matrix for further analysis was made by Nakamura (1998).

The input data in "Social Russia" are both the aggregated multi-sector national accounts and micro data on the basis of quarterly all-Russia household surveys. This enables both to follow macro economic trends and reflect them in the model, and to amend the figures with actual patterns of consumer behavior.

The size and scope of unofficial economy with its specific rules and regulations has grown sharply after the break of the Soviet Union and first steps towards market economy in Russia. Although the end of 1990s and the beginning of the 2000s have evidenced certain labor market legalization, the share of unofficial economy in Russia is still argued to range from 20 to 40% of Gross Domestic Product. The impact of the informal economic activity on the overall economy is assessed in various ways. Although all researchers underline the losses to State budget due to tax evasion by employers, losses in security for employees and ambiguity of informal laws (Klyamkin, Timofeev, 2000, Satarov, 2002), a number of economic literature outlines positive features of informal activity (Gimpelson, 2002). In particular, the rise of informal sector was a natural reaction to administrative barriers and helped to sustain a certain level of income for those involved in informal sector production (Dolgopyatova, 1995, 1998). Goods and services manufactured within informal sector become a significant input to overall supply in the economy.

The 2004 UST reform in Russia was regarded as the means for legalizing labor market and stimulating economic growth. It is seen as the logical continuation of the 2003-2004 Russian tax reform, originally aimed at eliminating a number of obstacles to economic growth, including those related to consumer and producer incentives[1]. This paper analyses the decrease of Unified social tax – one of the major payroll taxes in Russia paid by all employers. The UST goes to state off – budgetary funds (Pension fund, Social Insurance Fund, Federal Mandatory Health Insurance Fund, Territorial Mandatory Health Insurance Funds)[2].

Reduction of the Unified social tax (UST) is regarded as a major means to promote labor market legalization (that is reduction of employment within enterprise which is paid so as to avoid payroll taxes) and decrease the size of informal sector, which is mostly concentrated in undeclared income in formal looking structures. It is also viewed as an

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[1] There are federal, regional and local taxes in the Russian Federation. Tax bases, tax rates and tax revenue split are set by different levels of government according to Budget and Tax Codes and annual Budget law. This paper does not deal with administrative reform and analyses revenues and expenditures of the aggregated government (combines federal, regional and local governments).
[2] See appendix for detailed tables on UST for different annual salary intervals.

instrument to contribute to economic growth through stimulating production off goods and services. The Federal law of July, 20 2004 established the decrease of the UST rates from 35,6% of the payroll to 26%[3]. Many surveys aimed at determining the most effective size of UST reduction and assessing its economic consequences have been conducted in Russia in the pre-reform period of 2004. Vasilieva and Gurvich (2004) note the expected growth in salary of official sector workers due to UST decrease. The preliminary socio-economic analysis of expected business behavior after UST rate reform (Simachev, 2004) found that enterprises welcome the largest of the proposed UST reduction till the level of 26% (adopted in the Federal law on the reform) and plan to increase salary and investment, but will not decrease the size of shadow employment.

The purpose of this paper is to estimate the results of the UST reform on the overall Russian economy, and in particular on the 2 social sectors of healthcare and education and contrast them to the institutional changes in the informal sector activity composition. The choice of these two social sectors is justified not only by their importance for all consumers and for the state from the point of view of human capital. Healthcare and education in Russia witnessed a sharp rise in both formal and informal payments, partly due to the decrease of real government spending which could not cover officially guaranteed volume of services for all citizens and partly to the institutional reforms allowing market activity without establishing due legislative regulation.

The CGE model "Social Russia" developed for the study has 5 economic agents in the model (state, market and shadow sectors of economy, aggregate government and aggregate consumer) and 3 industries (production of a composite consumer good – all other goods and services, healthcare and education industries). The phenomenon of shadow (informal) sector in Russia is complex. In the analysis in this paper, shadow sector includes all types of non-registered activity as to avoid taxes: firstly, informal activity on small enterprises and within small groups of labor force not registered officially and not reflected

in tax forms[4]; secondly, all types of informal activity within official sector – e.g. bribes, informal payments, free use of production factors etc.

Interaction between agents is modeled through game-theoretic process. The major parameters of the model are intermediate and final goods, labor, inventories, prices on goods and production factors, tax rates, consolidated budget income and expenditure, and major macroeconomic indicators (GDP, gross production, consumer income and expenditures).

The paper is organized in the following way. The first section outlines the problems and approaches to general equilibrium modeling in the developed and transition countries, and the attempts of CGE modeling Russian economy. Next section describes the model "Social Russia", aimed at computing interrelations in the economy with the emphasis on processes in healthcare and education. The last section demonstrates the results of computational simulations on the basis of the propositions of economic tax reforms and changes in institutional rules within the framework of the model.

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[4] ILO methodology based on Resolution Concerning the International Classification of Status in Employment adopted by the Fifteenth International Conference of Labor statisticians, 1993.

2. Approaches to general equilibrium modeling of the Russian economy

Recently, CGE modeling has become quite wide-spread in transition countries. There are CGE models of Poland (Piazolo, 1998), Czech Republic (Barry, Bradley, Kejak and Vavra, 2000), Belarus (Bakanova and de Souza, 2001), Ukraine (Kosse, 2002).

Originally developed for western countries, the CGE approach has met a lot of criticism when applied to modeling economies in transition. The major problems are the lack of statistical material, as well as difficulties with parameter input and calibration. It is usually noted (Hare and Bevan, 1996) that one can not assume initial equilibrium in the base period in transition economy. Incorporating various shocks and potential changes is another challenge for CGE modeling. As for the attempts to overcome "transition handicap" Piazolo (1998) mentions the change of the data for one economy with that for another. Hare and Bevan (1998) apply multi sector partial equilibrium and time period model when the mechanism for equilibrium adjustment is assumed to be completed.

The RUSEC model (Makarov, 1999) proposed for this research has been used as economics and mathematics instrument for various purposes. In particular, it was employed for determining the influence of gas tariff changes on the economic development indicators: GDP growth rate, investment dynamics, population income, changes in demand for various sectors of economy. The following major modifications of RUSEC are listed below:

• CGE model with Gas Industry "RUSEC-GAZPROM" (Makarov, Bakhtizin, Afanasiev, 2003), aimed at assessing how Russian economy's major indicators react to the increase in rise in gas tariffs[5]. The three sectors: gas industry, other economic industries and aggregated household are analyzed within the model.

• Computable model with Electric Energy and Gas Industries "RUSEC- natural monopolies" (Makarov, Afanasiev, Bakhtizin, 2004)[6]. Gazprom and Russian joint-stock company "Unified Energy Systems" (*RAO EES*) are viewed as separate independent agents in the model. The series of experiments assessing the impact of the rise in electric energy

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[5] The model was developed for the Ministry of Economic Development and Trade
[6] The model was developed for the Ministry of Economic Development and Trade, and *Situation Center* under the Ministry

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and gas prices on the major Russian macroeconomic indicators have been conducted within the model.

- Computable model with Federal Districts "Russia: Center – Federal Districts" (Bakhtizin, 2003) describes economic interrelation between the Federal center and 7 federal districts. The computational experiments conducted within the model prove that even minor revenue redistribution between different levels of budgetary system helps achieve economic growth without involving extra financial resources.

- Industrial CGE model (Akopov, Beklaryan, 2004). The study focuses on the natural monopolies and oligopolies in the energy sector. The assessment of regulatory policy is implemented by dynamic simulations mechanism.

In the original RUSEC model Makarov modifies the classic Arrow-Debreu model for a 2-tier economy with state and market prices. There are three markets for each product: the state market with set prices, the market mechanism with free prices and shadow economy with market mechanism. The model includes the features of game-theoretic and other modeling approaches. In a general sense the model is a several-person game in normal form. The model allows to build in any type of dependencies, for example found with the use of econometric methods. Flexibility of the model provides for easy change of its mathematical part which is crucial for scenario simulations. Another special feature is a two-tier structure with the functioning of state and market prices (Makarov, 1994). The model operates with a number of macroeconomic indicators such as GDP, budget, money, price levels in different sectors of economy. All the above mentioned indicators reflect the interactivity of all economic actors. The model is calibrated according to the monthly data of the State Statistics Committee of the Russian Federation. Applying short-time horizon for calibration (12 points in the base year) and adjusting such exogenous variable as shares of producer and consumer budget in calibrating the prolonged model helps to overcome economic shocks, associated with transition countries.

There are a number of other CGE models for Russia (Kuleshov and Marshak, 2002; Alekseev et al., 2004; Ruhl et al., 2003; International Labor Organization model). As

distinct from RUSEC currently existing CGE models are static, do not analyze shadow sector and do not use a set of state and market prices.

As for healthcare and education, there are the following common approaches to modeling economic processes with regard to these spheres:

The analysis of economic equilibrium in general, the research is aimed at estimating macroeconomic interrelations, usually in connection with international trade. The production structure of the economy may include healthcare or education industries (e.g. state and private healthcare, Cororaton, 2000; healthcare, education and social support, Alekseev et al., 2004).

Specialized surveys concentrate on selected indicators in healthcare, education and in economy in general within the general equilibrium framework. This analysis uses consumer demand and production functions in corresponding social industries (Mayeres and van Regermorter, 2003, Ballard and Goddeeris, 1999). The study is implemented with the use of CGE modeling.

A number of research aimed at detailed study of equilibrium in a particular industry. The analysis is very often implemented only at the theoretic level, with partial equilibrium and econometric approach (Evans, Tandon, Murray and Lauer, 2001, Duru and Paelinck, 1991, Karni and Zilcha, 1993).

The CGE analysis in this paper uses the first of the above mentioned three approaches. Namely, healthcare and education are singled out in the production structure of Russian economy. The special features of these industries are reflected in production function coefficients, the size of shadow sector, consumer demand for healthcare and education services at state, market and shadow prices, tax privileges, and labor mobility.

3. CGE model "Social Russia"

3.1 General description

The model was constructed as a modification of RUSEC with the following changes:

- The 3 industries (healthcare, education and all other industries[7]) are considered.

- The shadow sector is formed on the basis of the other 2 sectors' factors of production and acts as an economic agent whose actions influence the activity of official sector producers, consumer and government behavior.

- The labor is modeled with incorporation of labor mobility between sectors and industries.

The model is in its essence balance model without explicit utility or profit maximization. The shares of consumer budget, spent on goods at market and shadow prices are taken from official statistics and assumed to reflect rational behavior of individuals. The same approach is used for producer choice of buying factors of production. The economy in the model is closed. Since healthcare and education are mostly non-tradable goods, only home products are considered. Agents can save money on banking accounts. Investment goods and revenue on capital are not singled out in the model.

There are 5 economic agents in the model. *The state sector* produces other goods, healthcare and education services. It further separates this output into intermediate goods for inter-industry inter-sector trade and investment into production and final goods to be sold to consumer. In other words each industry of the state sector buys and sells intermediate goods at all prices; buys and sells inventories at state prices; pays labor services state prices; determines the share of production to be sold at the markets for intermediate and final goods at all prices; pays taxes and receives subsidies; saves money on bank accounts.

Producers of *market sector* behave in the same way as those of the state sector. The difference is in operating market prices at labor and capital markets. The actions of each industry of market sector are the following: it buys and sells intermediate goods at all

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[7] Later in text referred to as "other industries" and "other goods".

prices; buys and sells inventories at market prices; pays labor services market prices; determines the share of production to be sold at the markets for intermediate and final goods at all prices; pays taxes; saves money on bank accounts.

State Statistics Committee estimates of *informal sector* usually determine the size of purely informal economy (non-registered activity and/or no-tax paid), this is coefficient γ (Methodological Regulations on Statistics, Vol.4, Goskomstat, 2004).

As for approaches to measure the actual size of this informal sector on the macro level, the researchers usually employ physical input method of Shneider and Ernste (2000) along with implied tax revenue and labor participation approaches (Shadow economy in Russian regions, 1997). In particular, the labor approach analyses discrepancy between labor force and labor productivity in the overall economy (Schneider, 2000). The major difficulty in the micro estimations based on household revenue, consumption and activity data are methodological inability to distinguish secondary activity (second job) and informal activity (Roschin, Razymova, 2002).

This paper attempts at a more broad modeling Russian realities. The 2 components of *shadow (informal) sector* are considered: informal economy (as defined by State Statistics Committee), and informal activity at legal work. *Shadow sector* is formed by the inflow of the production factors (labor and capital):

(1) $K = \alpha K_1 + \beta K_2 + \gamma(K_1 + K_2)$

(2) $L = \alpha L_1 + \beta L_2 + \gamma(L_1 + L_2)$,

where:

K – shadow sector inventories;

K_1 – state sector inventories;

K_2 – market sector inventories;

L – shadow sector labor;

L_1 – state sector labor;

L_2 – market sector labor;

α - coefficient of informal activity in the state sector;

β - coefficient of informal activity in the market sector;

γ - coefficient of informal sector size.

α and β allow to incorporate informal activity in legal work (this is particularly relevant for healthcare and education and is reflected in informal payments).

The behavior of the shadow sector is the following: it buys and sells intermediate goods at all prices; pays labor services shadow prices; determines the share of production to be sold at the markets for intermediate and final goods at all prices; saves money on bank accounts. The shadow sector is, therefore, the agent with its activity related to other parameters of legal economy.

Production function in each industry is Cobb-Douglas $Y = F(K, L, Z)$,

where K – capital (inventories); L – labor; Z – intermediate good.

The preliminary estimates of the production function parameters were based on the factor input approach (for labor, salary fund divided by output). The expert considerations of the growth of labor coefficient from other industries to healthcare and further to education, and the decrease of capital coefficient in the same direction, as well as low capital impact in the overall economy were also incorporated in the analysis.

Aggregate consumer works in the 3 sectors of economy; owns cash and money on bank accounts; pays taxes and receives social transfers; buys final product at all prices. Aggregate consumer in the first period of time supplies labor to all the industries of state and market sectors of economy according to the salary levels in each of the industry of these sectors. According to the model assumptions there are the following labor mobility within these industries:

State sector, other industries	→	market sector, other industries
State sector, healthcare	→	state sector, other industries
State sector, healthcare	→	market sector, other industries
State sector, healthcare	→	market sector, healthcare
State sector, education	→	state sector, other industries
State sector, education	→	market sector, other industries

State sector, education   →   market sector, education

Choice of the direction labor mobility is justified by the following observations:

Decrease of labor force in state sectors of healthcare and education and increase of employment in the market sector in corresponding industries with simultaneous growth of the number of healthcare and education institutions in market sector and decrease of those in state sector.

Low salaries and growing unemployment in state budget sector, anecdotal evidence and the data for non-representative interviews of the unskilled labor in market and shadow sector.

The paths of healthcare and education college graduates with the common behavior of only short term employment at the state sector institution for social privileges and work experience.

This paper uses Nekipelov (2003) assumption of Markov equation of labor mobility. In other words, the labor structure x_N evolves in time the following way:

$$x_N = P \times x_{N-1} = P^2 \times x_{N-2} = \ldots = P^{N-1} \times x_1,$$

where P–the probability matrix, the sum of its components in each row and column equals one. The coefficients of the matrix were estimated with the use of Vector Autoregression on the basis of Goskomstat monthly data. The estimates of statistically significant labor mobility coefficients served as benchmarks in the process of model calibration.

Aggregate government combines federal and regional consolidated budgets and 4 off-budgetary funds. Aggregate government collects taxes from producers and consumers and gives subsidies to all 3 industries of the state sector and to consumers.

There are 3 types of markets in the model. As for *labor market*, state and market sector employ labor offering correspondingly state (fixed) and market salary levels in each industry. As is above mentioned, there is labor mobility between the industries within state and market sectors. A part of state and market sector workers are assumed to be employed

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in the shadow sector, determining their decisions on the basis of shadow market salary. There are 3*3=9 labor markets in the model.
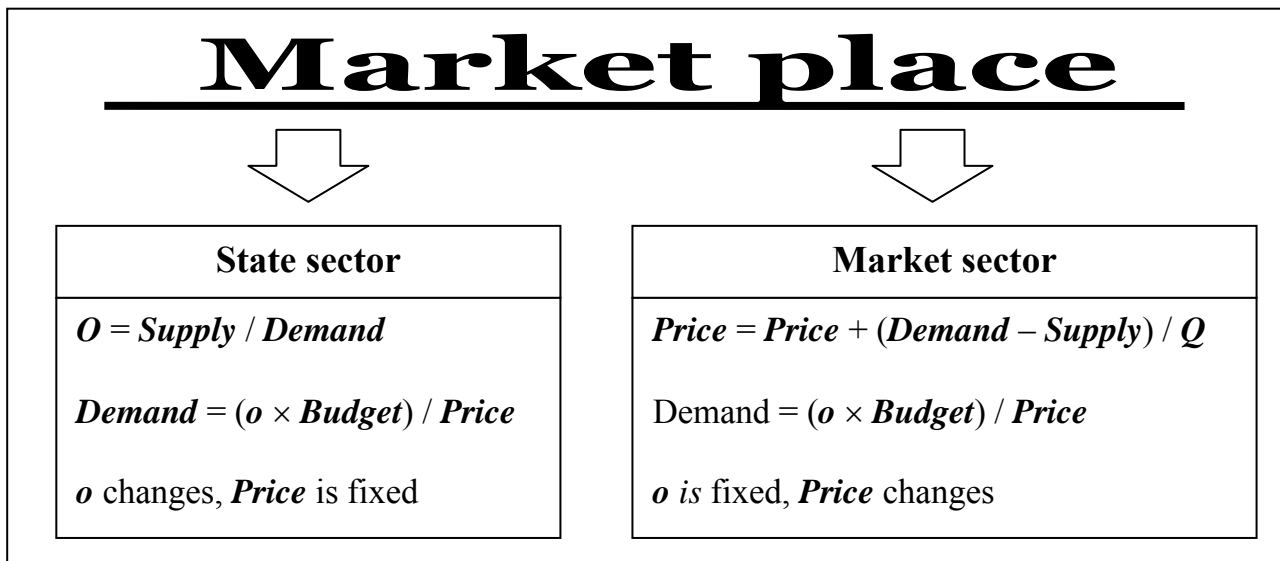
At capital market, state and market sector offer aggregate demand for capital for each industry. Shadow sector gets capital from state and market sector for free in the same proportion as it receives the labor. The are 3*2=6 capital markets in the model.

Producers in each industry of each sector divide output into intermediate and final product. Intermediate product is then traded between industries and sectors. There are 3*3=9 *intermediate goods* markets in the model.

Final goods are produced by all th3 3 industries of the 3 sectors and is consumed by consumer. There are 3*3=9 final goods markets in the model.

There are 3 types of prices on production factors for each industry, intermediate and final goods produced by each industry in the model. These are state (fixed) prices and market prices (determined by supply and demand adjustment).

The industry produces output and divides in into intermediate and final good. It receives revenue (*industry gain*) from selling these intermediate and final goods and part of the inventories. The industry obtains profit which equals this industry gain minus expenditures on intermediate goods, capital and labor and revenues from selling intermediate and final goods at shadow prices (for these are not reflected in the tax base). Value added for each industry is computed as this profit plus labor expenditures. GDP in the economy is then computed as the sum of value added in all the industries of the state and market sectors. Industry budget is the inner parameter of the model. It equals to industry gain, the state subsidy (equals zero for market sector industries) and the interest on budget reminder.

Market place

State sector	Market sector
$O = Supply / Demand$	$Price = Price + (Demand - Supply) / Q$
$Demand = (o \times Budget) / Price$	$Demand = (o \times Budget) / Price$
o changes, **Price** is fixed	o is fixed, **Price** changes

Fig. 1 – Computational mechanisms in "Social Russia"

3.2 Model calibration

As was above mentioned, the coefficients of labor mobility were estimated in Econometric Views package on the basis of the Markov process assumption of the labor structure in Russia (Nekipelov, 2003)[8]. Appendix B presents the results of autoregression estimates for labor mobility.

The parameters of informal activity and activity of informal sector were expertly determined. Table 1 gives the values of these parameters. They are estimated on the basis of State Statistics Committee (*Economic activity of Russian population (on the basis of sample surveys results)*, Moscow, 2002) – parameter γ and Independent Institute for Social Policy surveys (informal interviews with healthcare and education officials on the prevalence of informal activity) - α and β.

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[8] The State Statistics Committee monthly data for 1999-2001 of state and market sector employment were used for econometric estimation.

**Table 1 – Parameters of informal activity and informal sector in Russia**

Shadow sector components	Other industries	Healthcare, education
1. Share of state sector employers working informally (α)	0,125	0,25
2. Share of market sector employers working informally (β)	0,012	0,025
3. Size of informal economy (γ)	0,15	0,1

The model was calibrated on the basis of 2000 monthly data of the State Statistics Committee, Ministry of Finance of the Russian Federation, Central bank of Russia Bulletins. The essence of calibration was in adjusting certain exogenous parameters to the values, when integral indicators of the model, such as GDP, output, inflation etc. coincided with the values in official statistics. The justification of calibration approach is simultaneous equation system estimation, problems of degrees of freedom, and lack of data. Thissen (1998) mentions the special applicability of calibration for developing countries with significant changes in economic structure. Although there are certain problems with calibration approach this methods seems to be the only applicable for modeling the Russian economy. It is used in combination with econometric approach which neutralizes the most flaws in this data analysis.

Microsoft Excel was chosen as the package for calibration and solving the model due to its applicability for calibrating in real time, adding changes and new dependencies in the structure of the model, using conditional operators, and building value "corridors" for various parameters. In calibrating the model the researcher can use the features of Excel, allowing setting certain conditions on values, obtained after iteration calculations of the model. For example, one can set condition, when, regardless of the values of some intermediate endogenous variables, integral parameters coincide with statistics. After iteration recalculations all parameters influencing integral indicators obtain necessary values, and corresponding limitation conditions may be taken off.

After implementing the stage of calibration, the model was prolonged for the year 2001 to prove the model consistency. The difference between estimated and real parameters

was less than 4% (See figure 2 for GDP and output). Finally, the model was prolonged till the year 2006.
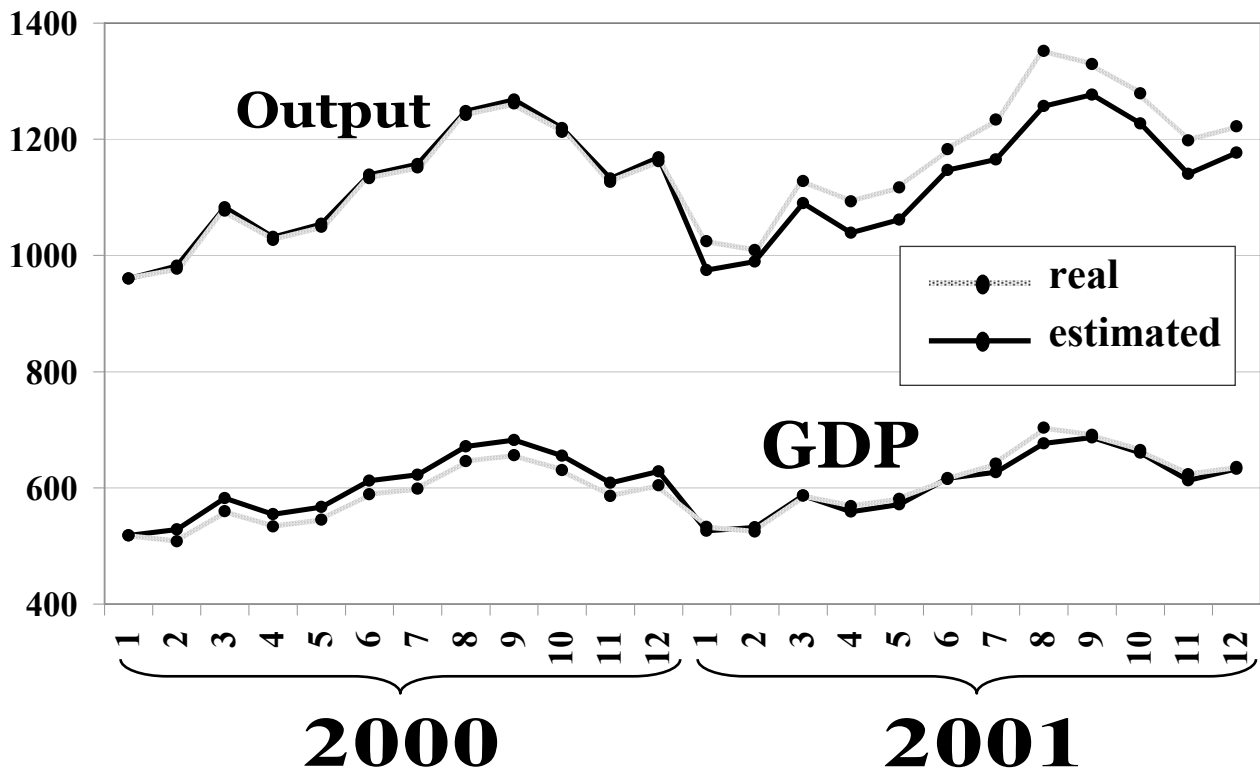
Fig. 2 – Model calibration (2000) and verification of model consistency (2001), real prices, billion rubles, Jan 2000=100%

4. Computational simulations

The purpose of constructing CGE model "Social Russia" was to create mathematics and economics instrument to analyze various socio-economic processes, related to government-consumer behavior and situation in healthcare and education industries.

It is well known that the health condition of population, the level of education, the accessibility and level of service provision in healthcare and education have considerably deteriorated in the period of transition. It is also that structural reforms coincided with decrease of state financing (Belyaeva, 2001) which contributed to the growth of consumer payments, the spread of informal practices which became deeply rooted among providers and consumers (Russian Healthcare: Payment in Cash, 2004, Shishkin, 2000, Shapiro, Besstremyannaya, 2002).

In healthcare the major problem is the break down between the constitutionally guaranteed services and the level of their financing. In healthcare misbalance in the course of reforms and insufficient state finance result in the decrease in secondary and higher education accessibility. The "Program of Socio-economic Development of the Russian Federation for 2003-2005" underlined provision of competitive human capital, creation of modern healthcare and education systems and the growth of state finance in these spheres as the necessary preconditions for economic development.

The currently adopted measures of tax reform are regarded as the instrument of solving a number of problems in social industries. The tax and budget reform were the key issues in the "Prognosis of the Socio-economic Development of the Russian Federation for 2004 and the Major Parameters of the Prognosis till 2006".

The projects of decreasing the level of unified social tax (UST) were aimed at creating the stimulus for producers to reject shadow salaries and for consumers to reflect their income. Producers will have lower expenses associated with labor, and therefore, larger revenue, which may be spent to the growth in production. The combination of larger consumption due to the development in consumer welfare and the rise in production is

likely to increase GDP and cause economic growth, which has been the major task of Russian government.

The model allows to consider different scenarios of the decrease in Unified social tax alone or in combination with changes of income tax. It reflects the corresponding changes in macroeconomic parameters for the whole economy (GDP, gross production, consumer income) as well as output, revenues and expenditures in each industry in each sector and the new levels of consumption of all the goods, including healthcare and education in state, market and shadow sector. The correlation between the tax rate changes and the above described parameters model the changes in the economy in the course of tax reform and may serve for normative and positive analysis.

The 3 computational simulations were conducted in the work:

- decrease of UST rate for 10% (till the level of tax rate equal to 32,2%);
- decrease of UST rate for 20% (till the level of 28,6%);
- decrease of UST rate for 30% (till the level of 26%).

The third computational experiment corresponds to the new level of UST rate, which came into force since January, 2005.

The same three simulations were then accompanied by the increase of personal income tax (PIT) from the level of 13 to 17%. This was an evaluation of one of the means to compensate the loss in government revenues due to UST decrease.

According to the results of computational simulations the UST rate decrease causes the growth of GDP and gross output in economy. The social sector industries also observe the growth of production reflected in increase of output. There is also a rise in salary in market sector social industries. The size (output) of shadow sector in healthcare decreases.

Table 2 – Percentage changes in GDP at different scenarios of UST decrease

Scenario	2000	2001	2002	2003	2004	2005	2006
UST 10% decrease	+0,04	+0,2	+0,7	+1,3	+1,6	+1,9	+2,3
UST 20% decrease	+0,1	+0,5	+1,3	+1,9	+2,1	+2,3	+2,7
UST 30% decrease	+0,1	+0,6	+1,4	+1,8	+1,9	+2,0	+2,3

Table 3 – Percentage GDP changes at various scenarios of UST rate decrease accompanied by personal income tax rate increase till 17%

Scenario	2000	2001	2002	2003	2004	2005	2006
UST 10% decrease and PIT increase	+0,5	+0,9	+1,6	+2,4	+2,8	+3,1	+3,5
UST 20% decrease and PIT increase	+0,6	+1,2	+2,2	+3,0	+3,3	+3,5	+3,8
UST 30% decrease and PIT increase	+0,6	+1,4	+2,3	+2,9	+3,0	+3,0	+3,3

Various scenarios of the UST rate decrease show positive correlation between the size of the rate decrease and the size of the above mentioned changes. The new 26% UST rate, proposed by Russian government is accompanied by the largest growth of GDP, output in social industries and economy as a whole and the largest fall of shadow sector output in healthcare.

The above summarized changes in economic indicators are explained by redirection of free funds to production by producers. This is reflected in the growth of output. Fewer tax on salaries allows to raise them.

The detailed analysis of the UST decrease impact on the economy as a whole and different agents gives the following picture.

In the *whole economy* there is a rise in the gross demand for final goods of each industry at state and market prices and on final goods of healthcare and education at shadow prices. The gross demand for other services production at shadow prices falls. There is an increase in market and shadow prices for labor, an increase in healthcare final goods shadow price, the decrease in market prices for final goods in each industry and decrease in shadow prices for other industries and education final goods.

In *state sector* the production and, therefore, intermediate consumption and final product increase. Profits and value added decrease. Industry gains and budgets increase. The supply of final goods at each price increase.

In *market sector* output, intermediate consumption and final goods of healthcare and education rise, output of other industries falls. Profits in healthcare and other industries rise,

in education – fall. Industry gains and budgets rise. The demand for labor in healthcare and education increase. The supply of final good of education at each price increase.

In *shadow sector* output, intermediate and final consumption of healthcare and other industries fall. The gain of other industries decreases, the gains and budgets of healthcare and education increase. The supply of final good at each price falls.

Aggregate government has lower revenues from UST. Consequently, total government revenue, off-budgetary funds revenue, subsidies to industries and consumers decrease. Nevertheless, pension fund revenue in the first 2 years is sufficient to pay 80-90% of pre-reform pensions.

Aggregate consumer's total revenues decrease in the first periods and then start to grow. This increase is greater then the growth of inflation. Aggregate salary fund in state sector does not change, in market and shadow sector it increases in each industry. This is caused by the growth of labor demand in market and shadow sectors, and results in the rise in the price of labor. The demand for final goods of each industry at state and market prices increases, the demand for final goods of healthcare and other services at shadow prices decreases.

In the long-run the larger rate of Unified social tax decrease cause the larger GDP growth (with better results in the 4th and consecutive periods at 20% rate decrease).

Table 4 – Percentage changes in inflation[9] and consumer income at various scenarios of UST decrease

Scenario	Parameter	2001	2002	2003	2004	2005	2006
UST 10% decrease	Inflation	+0,6	+1,8	+1,3	+1,1	+1,3	+1,5
	Income	-0,2	+0,8	+2,0	+3,0	+4,0	+5,3
UST 20% decrease	Inflation	+1,3	+2,5	+1,6	+1,3	+1,5	+1,6
	Income	-0,1	+1,5	+3,1	+4,2	+5,5	+7,1
UST 30% decrease	Inflation	+1,7	+2,7	+1,9	-0,1	+0	+0,1
	Income	-0,1	+1,7	+3,2	+4,2	+5,5	+7,1

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[9] Inflation is measured as market price level of December of the current year to the level of December of the previous year.

Table 5 – Percentage changes in inflation and consumer income at various scenarios of UST decrease and personal income tax increase till 17%

Scenario	Parameter	2001	2002	2003	2004	2005	2006
UST 10% decrease and PIT increase	Inflation	+0,9	+2,4	+1,9	+1,6	+1,5	+1,8
	Income	+0,9	+2,3	+4,0	+5,4	+6,7	+8,0
UST 20% decrease and PIT increase	Inflation	+1,7	+3,1	+2,1	+1,5	+1,5	+2,0
	Income	+1,0	+3,1	+5,2	+6,7	+8,1	+9,9
UST 30% decrease and PIT increase	Inflation	+2,2	+3,5	+1,5	+0,4	+0,5	+0,5
	Income	+1,1	+3,4	+5,4	+6,6	+7,8	+9,6

As can be referred from Tables 2-5 the increase of personal income tax rate causes greater GDP growth. It also leads to higher government revenue and, consequently, to larger industry subsidies and transfers to population. However, the inflation and this scenario is higher. There is also higher growth of salaries in market and shadow sectors.
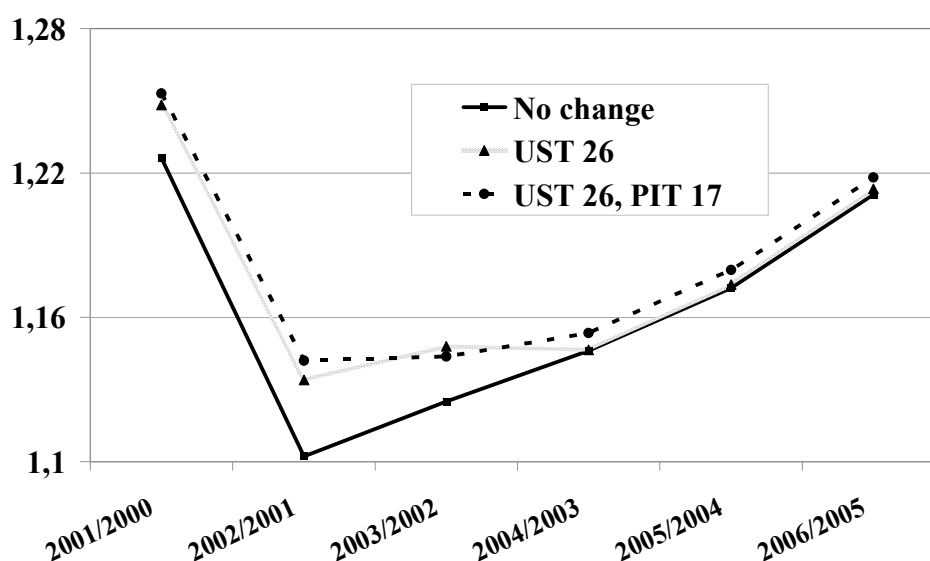
Fig. 3 – Indices for market prices (other industries)

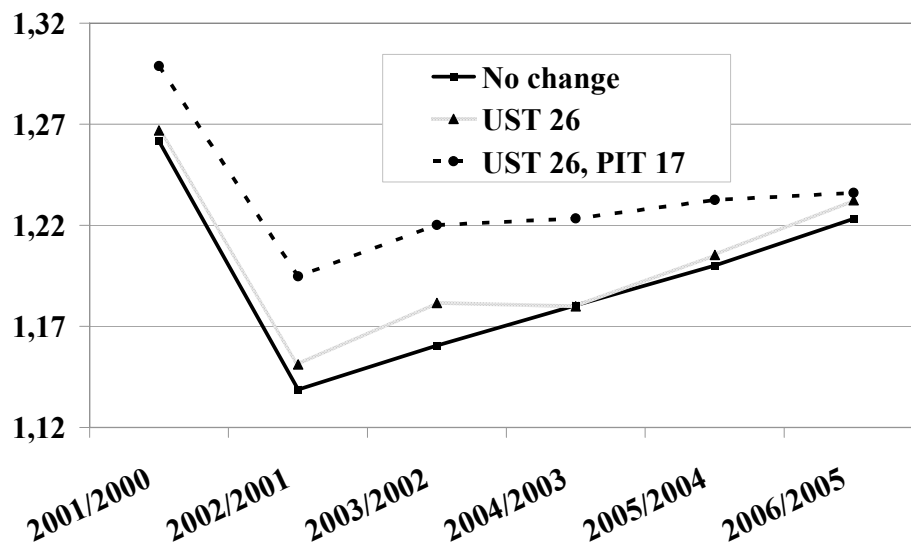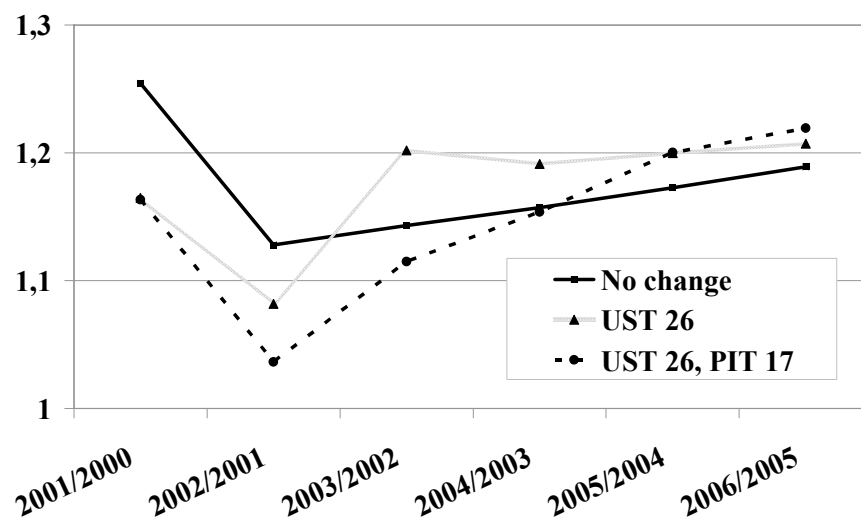**Fig. 4 – Indices for market prices (healthcare)**

Fig. 5 – Indices for market prices (education)

The lowest growth of consumer market prices in the medium run is viewed at UST decrease till 26%, except for education industry in the first 3 years, where UST and PIT reform produces better results.
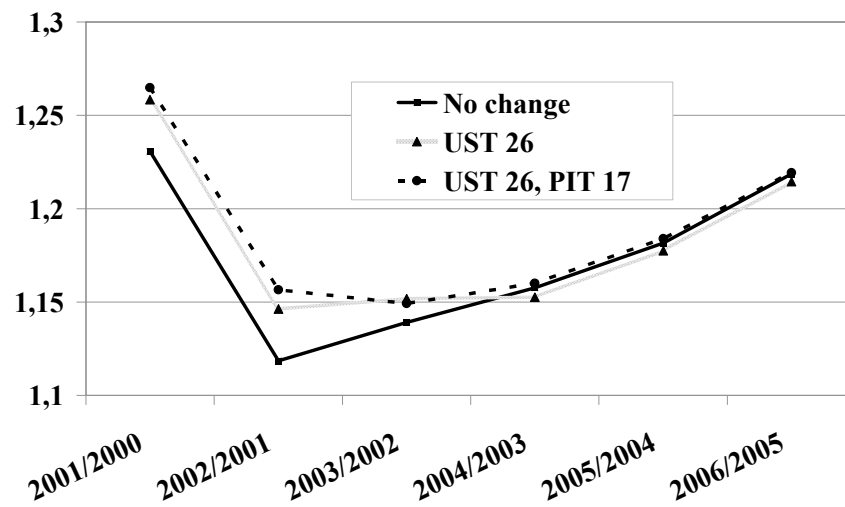
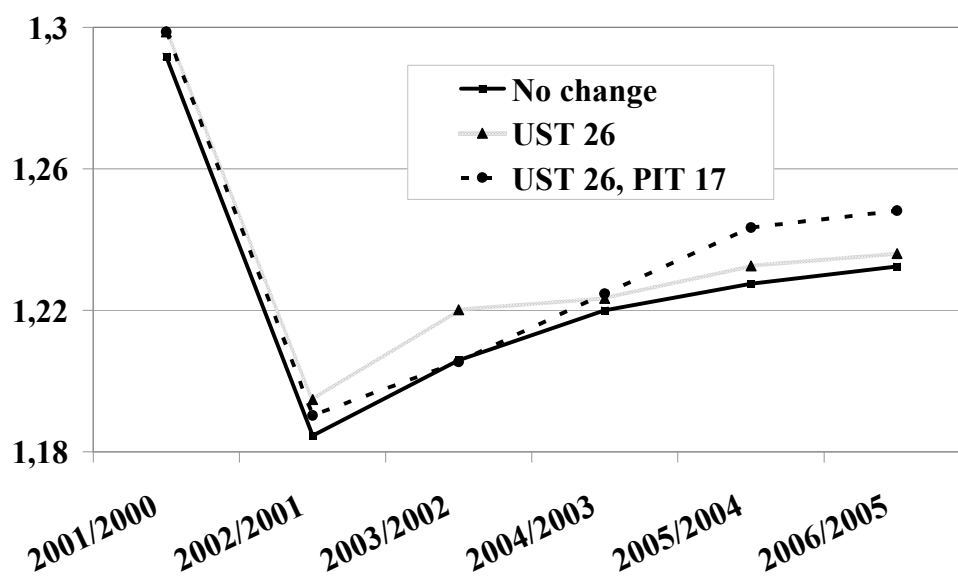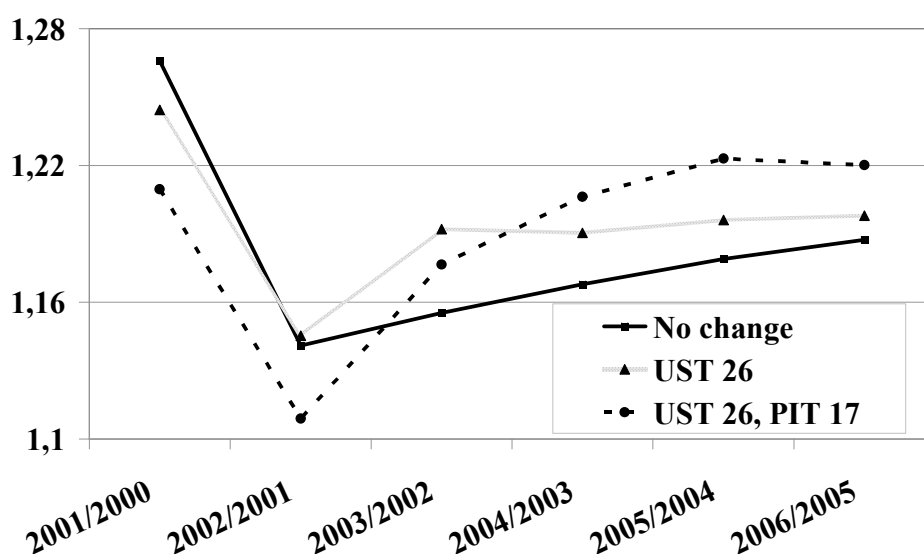**Fig. 6 – Indices for shadow prices (other industries)**

Fig. 7 – Indices for shadow prices (healthcare)

Fig. 8 – Indices for shadow prices (education)

While there is practically no change in the shadow prices in other industries and healthcare, in education UST decrease gives lower rise in prices as compared to Personal income tax rise starting from the 4th period.

Computational simulations show that the size Unified social tax rate decrease is positively correlated with GDP growth and with the difference between change in consumer income and inflation. It is negatively correlated with the size of shadow sector production growth. Nevertheless, it does not prevent shadow sector growth at all (except for the decrease of shadow sector output in healthcare. This demonstrates that tax measures are not sufficient, given the coefficients of shadow employment and official work remain the same. Although there are macroeconomic gains when this measure is accompanied by the increase of personal income tax rate, the social consequences for the economy are ambiguous. In particular, higher GDP growth and higher difference between consumer income and inflation is accompanied by higher inflation.

As for the decrease of the Unified social tax alone, this reform indeed produces a positive effect on the overall economic growth as well as on the producer behavior and consumer welfare, which corresponds to the government tasks ("Prognosis of the Socio-economic Development of the Russian Federation for 2004 and the Major Parameters of the

Prognosis till 2006"). The aggregate salary fund in the shadow sector, however, continues to increase both in healthcare and education. In the first 3 periods it grows even higher than in the no tax reform situation.

Institutional changes in the composition of informal sector.

To estimate the sensitivity of the results to changes of exogenous parameters, the shares α and β of informal activity at official place of work in state and market sector were decreased at 50% while parameter γ remained the same. This reflected decrease of informal activity due to institutional (non-tax changes).

Table 6 – New parameters of informal activity and informal sector in Russia

Shadow sector components	Other industries	Healthcare, education
1. Share of state sector employers working informally (α)	0,006	0,125
2. Share of market sector employers working informally (β)	0,012	0,012
3. Size of informal economy (γ)	0,15	0,1

The major results of sensitivity analysis are demonstrated in Appendix C.

The decrease of informal sector activity in the model framework causes decrease of shadow sector output and salary. While tax measures not accompanied by informal sector parameters decrease may also reduce shadow sector output and salary, their effect is comparatively weaker.

Lower parameters of informal sector cause reduction of official sector labor (mostly in state sector) in the short period, which proves that workers are attracted by state sector jobs assuming opportunity of informal activity due to free time and/or ability to use factor of production.

The decrease of informal activity is followed by rise in output, employment and salaries in market sector, and reduction in shadow sector output and salary.

6. Conclusion

The CGE analysis of the Russian economy shows that there is indeed a certain GDP growth after introduction of the UST decrease. The UST reform has ambiguous effect on labor market. On the one hand, there is a rise in official employment and salaries (due to considerable increase in market sector salaries), on the other, given institutional norms of shadow activity at legal work remain the same, there is only a slight decrease in shadow sector in healthcare. At the same time, education sees a sharp growth in shadow sector salary fund. There is a positive correlation between the above effects and the size of UST rate decrease. This that the government of the Russian Federation reform adopted by the most favorable version of reform. Yet, from the point of consumer UST decrease causes rise in the level of market and shadow prices in healthcare and education. This reflects both the change in consumer demand and in producer supply in these sectors.

If the lack of government revenue is compensated by the increase of Personal income tax there is a large inflation in economy, and real rise in GDP and consumer income is lower then in solely UST reform.

The analysis of healthcare and education response to the two tax measures shows that while the evolution of market sector in these industries can be influenced through tax measures, shadow sector decrease requires institutional changes. Informal activity at formally registered work has arisen due to administrative and legislative barriers to market sector development. Many social sector institutions are limited on the use of their revenues on paid services (so called *off-budgetary income* since it is opposed to state – budgetary - finance). The currently discussed bills of state autonomous enterprise and state non-commercial autonomous enterprise will give social sector more freedom to choose different forms of their organization. This freedom of using own revenues and capital funds, however, will be traded for obligations to pay for possible debts by own inventories and to search for consumer demand. As for informal activity, it is expected to decrease.

The model shows that if informal activity is decreased the economy indeed becomes more transparent with considerable reduction of shadow sector.

Acknowledgements

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Appendix A. Taxes in Russia

Table A1 – Structure of Tax Revenue by Major Taxes in Russia, percent

Taxes	2000	2001	2002	2003
Personal income tax	7,1	8,4	9,7	10,3
Unified social tax	21,8	19,7	22,3	22,2
Profit tax	15,9	16,5	12,6	12,1
Export excises	6,8	7,2	5,3	7,0
Import excises	2,6	3,5	3,5	3,6
VAT on import	4,1	5,2	5,9	6,4
Home VAT	14,4	15,3	14,4	13,9
Consumer goods excises and sales tax	3,8	4,6	5,0	5,5
Resource payments	8,8	9,0	12,6	12,7
Other taxes	14,7	10,7	8,8	6,1
Total tax revenue	100,0	100,0	100,0	100,0

Source: Vasilieva and Gurvich (2004), Table 7

Table A2 – Structure of Tax Revenue by Major Taxes in Russia and other countries, percent

Taxes	Russia, 2003	Central and Eastern Europe, 2002	EU, 2002	USA, 2002
Income	22,4	24,7	34,1	44,4
Personal	10,3	16,6	25,6	37,7
Corporate	11,9	8,1	8,6	6,7
Social	22,2	36,7	28,1	26,1
On consumption	29,5	33,6	28,4	15,1
Other	25,9	5,1	9,4	14,4
Total	100,0	100,0	100,0	100,0

Source: Vasilieva and Gurvich (2005), Table 2

Table A3 – Unified Social Tax Rates in 2000-2004

Tax base (annual salary of worker, rubles)	Federal budget (Pension fund)	Social Insurance Fund	Federal Mandatory Health Insurance Fund	Territorial Mandatory Health Insurance Funds	Total Unified Social Tax Rate
Less than 100 thousand rubles	28%	4%	0,2%	3,6%	35,6%
100001-300000 rubles	28000+15,8% from the	4000+2,2% from the	200+0,1% from the	3400+1,9% from the sum above	35600+20% from the

Tax base (annual salary of worker, rubles)	Federal budget (Pension fund)	Social Insurance Fund	Federal Mandatory Health Insurance Fund	Territorial Mandatory Health Insurance Funds	Total Unified Social Tax Rate
	sum above 100000.	sum above 100000	sum above 100000	100000	sum above 100000
300001-600000 rubles	59600+7,9% from the sum above 300000	8400+1,1% from the sum above 300000	400+0,1% from the sum above 300000	7200+0,9% from the sum above 300000	75600+10% from the sum above 300000
More than 600 thousand rubles	83300+2% from the sum above 600000	11700	700	9900	105600+2% from the sum above 600000

Source: Tax Code, 2000.

Table A4 – Unified Social Tax Rates in 2005

Tax base (annual salary of worker, rubles)	Federal budget (Pension fund)	Social Insurance Fund	Federal Mandatory Health Insurance Fund	Territorial Mandatory Health Insurance Funds	Total Unified Social Tax Rate Total
Less than 280 thousand rubles	20%	3,2%	0,8%	2%	26%
280001-600000 rubles	56000+7,9% from the sum above 280000	8960+1,1% from the sum above 280000	2240+0,5% from the sum above 280000	5600+0,5% from the sum above 280000	72800+10% from the sum above 280000
More than 600thousand rubles	81280+2% from the sum above 600000	12480	3840	7200	104800+2% from the sum above 600000

Source: Amendments to Tax Code, 2004.

Appendix B. Model "Social Russia"

Fig. B1 – The scheme of the model

○ – market place;

□ – agent;

Market places

L – labor market place;

K – capital funds (inventories) market place;

Z – intermediate good market place;

C – final goods market place.

Arrows

Arrow inside market place – an agent sells at the market place.

Arrow outside market place – an agent buys at the market place.

Bold arrow – flows of taxes and subsidies.
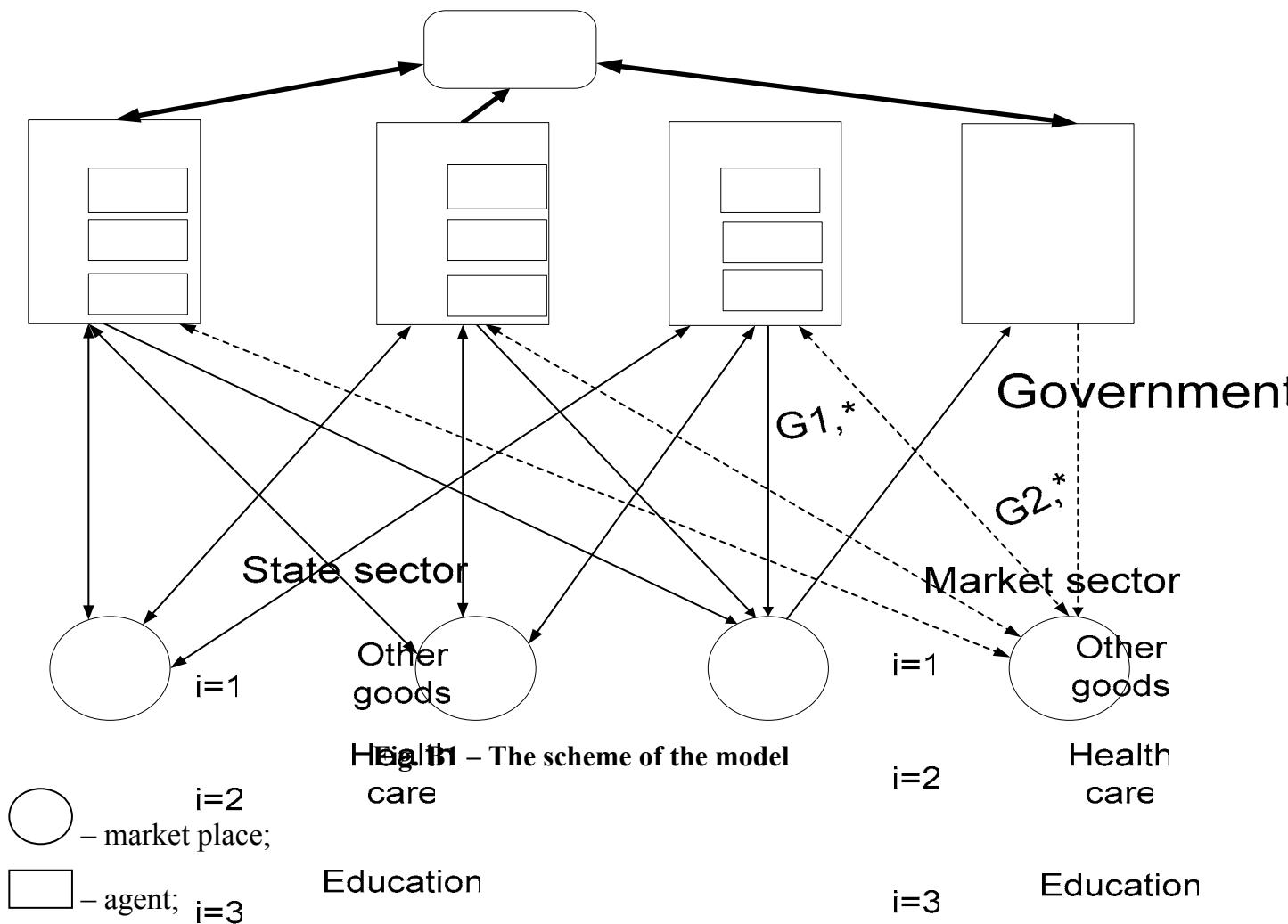
Notations

Ln,*,*,* – labor flows from *i* industry of *n* sector to *i** industry of *n** sector, *i*=1,3, *n*=1,2

L4 – supply of labor to market place.

Kn,* – capital flows between *i* industry *n* sector (*i*=1,3, *n*=1,3) and all other industries of state and market sectors.

Zn,* – intermediate product flows between *i* industry *n* sector (*i*=1,3, *n*=1,3) and all other industries of all the 3 sectors.

Cn,* – final product flows between *i* industry *n* sector (*i*=1,3, *n*=1,3) and consumer.

Gn,* – flows of taxes (*i*=1,3, *n*=1,2) and subsidies (*i*=1,3, *n*=1) between *i* industry *n* sector and government.

G4 - flows of taxes and subsidies between government and consumer.

Table B1 – Significant coefficients of labor mobility

	Other industries, state, *t*	Healthcare and education, state, *t*	Other industries, market, *t*	Healthcare and education, market, *t*	Unemployment, *t*
Other industries, state, *t* – 1	+	+			
Healthcare and education, state, *t* – 1		+			
Other industries, market, *t* – 1			+		
Healthcare and education, market, *t* – 1				+	
Unemployment, *t* – 1				+	+

Due to linear dependence of the 5 corresponding equations, the matrix 4×4 was analyzed in Autoregression estimate in Econometric Views. The coefficients and *t*-statistics for the remaining variables were obtained on the basis of variances and covariance matrix of the estimated parameters. This added significance of the inflow from unemployment status in the period (*t* – 1) to market healthcare and education sector in the period *t* and to unemployment in the period *t*.

The estimated stable character of the labor mobility matrix (mainly diagonal elements are significant) corresponds to the other works in this sphere (Sabirianova, 2001; Nekipelov, 2003).

Appendix C. Results of computational simulations

Table C1 – Indices of GDP and output

Parameter	2001/ 2000	2002/ 2001	2003/ 2002	2004/ 2003	2005/ 2004	2006/ 2005
1. GDP						
No tax change	1,422	1,186	1,173	1,180	1,187	1,199
No tax change, α,β decrease	1,427	1,186	1,171	1,176	1,180	1,186
UST 26	1,430	1,197	1,180	1,183	1,191	1,205
UST 26, α,β decrease	1,427	1,187	1,171	1,176	1,183	1,191
UST 26 and PIT 17	1,433	1,198	1,180	1,181	1,187	1,203
UST 26 and PIT 17, α,β decrease	1,436	1,199	1,184	1,189	1,196	1,205
2. Output (nominal)						
State sector						
Healthcare						
No tax change	1,036	1,062	1,058	1,051	1,044	1,038
No tax change, α,β decrease	1,044	1,064	1,060	1,053	1,045	1,038
UST 26	1,049	1,066	1,060	1,053	1,045	1,038
UST 26, α,β decrease	1,045	1,064	1,059	1,052	1,045	1,039
UST 26 and PIT 17	1,051	1,068	1,061	1,053	1,044	1,035
UST 26 and PIT 17, α,β decrease	1,054	1,066	1,060	1,054	1,049	1,044
Education						
No tax change	1,042	1,046	1,044	1,041	1,040	1,039
No tax change, α,β decrease	1,044	1,047	1,045	1,042	1,040	1,039
UST 26	1,045	1,049	1,046	1,042	1,040	1,039
UST 26, α,β decrease	1,043	1,047	1,045	1,041	1,040	1,040
UST 26 and PIT 17	1,047	1,049	1,046	1,042	1,038	1,038
UST 26 and PIT 17, α,β decrease	1,046	1,046	1,044	1,041	1,040	1,039
Market sector						
Healthcare						
No tax change	1,017	0,992	0,984	0,981	0,990	1,016
No tax change, α,β decrease	1,037	1,003	0,996	0,994	0,999	1,018
UST 26	1,030	1,009	1,005	1,005	1,012	1,030
UST 26, α,β decrease	1,032	1,000	0,994	0,995	1,005	1,035
UST 26 and PIT 17	1,038	1,012	1,004	0,998	0,995	1,007
UST 26 and PIT 17, α,β decrease	1,023	1,005	1,019	1,045	1,070	1,079
Education						
No tax change	1,008	1,006	1,014	1,026	1,048	1,094
No tax change, α,β decrease	1,240	1,138	1,068	1,031	1,040	1,080
UST 26	1,344	1,300	1,156	1,113	1,155	1,169

Parameter	2001/ 2000	2002/ 2001	2003/ 2002	2004/ 2003	2005/ 2004	2006/ 2005
UST 26, α,β decrease	1,194	1,153	0,988	0,980	1,136	1,229
UST 26 and PIT 17	1,466	1,306	1,181	1,017	0,984	1,127
UST 26 and PIT 17, α,β decrease	1,150	1,200	1,392	1,441	1,357	1,255
Shadow sector						
Healthcare						
No tax change	1,015	0,977	0,970	0,970	0,981	1,003
No tax change, α,β decrease	1,024	0,984	0,968	0,954	0,947	0,962
UST 26	1,018	0,990	0,982	0,978	0,980	0,994
UST 26, α,β decrease	1,033	0,990	0,976	0,968	0,967	0,999
UST 26 and PIT 17	1,022	0,989	0,975	0,964	0,971	0,997
UST 26 and PIT 17, α,β decrease	1,033	0,977	0,960	0,956	0,962	1,001
Education						
No tax change	1,027	1,018	1,019	1,022	1,030	1,048
No tax change, α,β decrease	1,084	1,058	1,038	1,020	1,005	1,003
UST 26	1,071	1,059	1,032	1,019	1,017	1,024
UST 26, α,β decrease	1,091	1,060	1,035	1,042	1,051	1,051
UST 26 and PIT 17	1,084	1,057	1,021	0,992	0,997	1,026
UST 26 and PIT 17, α,β decrease	1,082	1,032	1,019	1,039	1,044	1,041

Table C2 – Indices of salary, government revenues, inflation, consumer income, healthcare and education accessibility

Parameter	2001/ 2000	2002/ 2001	2003/ 2002	2004/ 2003	2005/ 2004	2006/ 2005
1. Salary						
Market sector						
Healthcare						
No tax change	1,439	1,276	1,294	1,367	1,482	1,624
No tax change, α,β decrease	1,497	1,295	1,306	1,371	1,471	1,597
UST 26	1,517	1,334	1,345	1,406	1,499	1,614
UST 26, α,β decrease	1,500	1,302	1,317	1,388	1,496	1,635
UST 26 and PIT 17	1,530	1,332	1,335	1,388	1,470	1,590
UST 26 and PIT 17, α,β decrease	1,572	1,365	1,405	1,499	1,586	1,645
Education						
No tax change	1,492	1,401	1,448	1,561	1,701	1,863
No tax change, α,β decrease	1,904	1,573	1,485	1,522	1,652	1,818
UST 26	2,178	1,844	1,614	1,645	1,820	1,933
UST 26, α,β decrease	1,861	1,601	1,376	1,484	1,843	2,058

Parameter	2001/2000	2002/2001	2003/2002	2004/2003	2005/2004	2006/2005
UST 26 and PIT 17	2,364	1,837	1,638	1,486	1,570	1,911
UST 26 and PIT 17, α,β decrease	1,986	1,820	2,044	2,107	2,029	1,968
Shadow sector						
Healthcare						
No tax change	1,503	1,332	1,377	1,478	1,602	1,714
No tax change, α,β decrease	1,464	1,320	1,340	1,403	1,489	1,588
UST 26	1,571	1,381	1,405	1,477	1,572	1,667
UST 26, α,β decrease	1,489	1,341	1,365	1,435	1,519	1,621
UST 26 and PIT 17	1,573	1,370	1,388	1,460	1,570	1,689
UST 26 and PIT 17, α,β decrease	1,571	1,424	1,448	1,483	1,498	1,547
Education						
No tax change	1,606	1,478	1,532	1,642	1,748	1,819
No tax change, α,β decrease	1,603	1,485	1,507	1,586	1,663	1,712
UST 26	1,750	1,546	1,539	1,609	1,691	1,754
UST 26, α,β decrease	1,624	1,503	1,520	1,624	1,716	1,764
UST 26 and PIT 17	1,757	1,531	1,525	1,588	1,684	1,771
UST 26 and PIT 17, α,β decrease	1,776	1,664	1,671	1,674	1,654	1,643
2. State						
Consolidated budget						
No tax change	1,713	1,147	1,146	1,152	1,158	1,173
No tax change, α,β decrease	1,714	1,147	1,146	1,151	1,157	1,170
UST 26	1,718	1,155	1,153	1,157	1,171	1,189
UST 26, α,β decrease	1,714	1,147	1,146	1,151	1,159	1,174
UST 26 and PIT 17	1,712	1,157	1,154	1,158	1,172	1,190
UST 26 and PIT 17, α,β decrease	1,713	1,158	1,157	1,166	1,183	1,201
UST revenue						
No tax change	1,433	1,169	1,165	1,181	1,197	1,218
No tax change, α,β decrease	1,440	1,174	1,169	1,181	1,194	1,214
UST 26	1,447	1,195	1,187	1,196	1,215	1,245
UST 26, α,β decrease	1,440	1,174	1,168	1,181	1,198	1,223
UST 26 and PIT 17	1,452	1,198	1,189	1,195	1,209	1,242
UST 26 and PIT 17, α,β decrease	1,455	1,200	1,198	1,217	1,241	1,274
Personal income tax revenue						
No tax change	1,420	1,169	1,167	1,181	1,195	1,217
No tax change, α,β decrease	1,426	1,172	1,169	1,182	1,195	1,215
UST 26	1,434	1,194	1,187	1,197	1,216	1,246
UST 26, α,β decrease	1,426	1,173	1,169	1,182	1,199	1,225

Parameter	2001/ 2000	2002/ 2001	2003/ 2002	2004/ 2003	2005/ 2004	2006/ 2005
UST 26 and PIT 17	1,439	1,197	1,190	1,196	1,210	1,243
UST 26 and PIT 17, α,β decrease	1,441	1,198	1,199	1,218	1,242	1,275
Inflation						
No tax change	1,226	1,102	1,125	1,146	1,172	1,211
No tax change, α,β decrease	1,228	1,104	1,124	1,140	1,160	1,189
UST 26	1,248	1,134	1,148	1,146	1,174	1,213
UST 26, α,β decrease	1,229	1,105	1,124	1,143	1,168	1,201
UST 26 and PIT 17	1,253	1,142	1,144	1,153	1,180	1,218
UST 26 and PIT 17, α,β decrease	1,252	1,142	1,160	1,184	1,212	1,245
Consumer income						
No tax change	1,555	1,180	1,170	1,190	1,212	1,245
No tax change, α,β decrease	1,559	1,182	1,170	1,185	1,202	1,228
UST 26	1,568	1,205	1,192	1,205	1,230	1,268
UST 26, α,β decrease	1,559	1,182	1,171	1,187	1,208	1,239
UST 26 and PIT 17	1,573	1,207	1,194	1,204	1,226	1,267
UST 26 and PIT 17, α,β decrease	1,573	1,208	1,201	1,221	1,248	1,281
3. Accessibility[10]						
Healthcare						
No tax change	0,490	0,480	0,480	0,480	0,480	0,490
No tax change, α,β decrease	0,492	0,476	0,471	0,466	0,463	0,468
UST 26	0,490	0,480	0,480	0,480	0,480	0,480
UST 26, α,β decrease	0,497	0,480	0,475	0,473	0,472	0,482
UST 26 and PIT 17	0,490	0,480	0,470	0,470	0,480	0,490
UST 26 and PIT 17, α,β decrease	0,498	0,472	0,462	0,455	0,454	0,472
Education						
No tax change	0,500	0,500	0,500	0,490	0,490	0,490
No tax change, α,β decrease	0,475	0,484	0,492	0,492	0,483	0,473
UST 26	0,450	0,450	0,470	0,470	0,460	0,460
UST 26, α,β decrease	0,488	0,482	0,509	0,516	0,483	0,463
UST 26 and PIT 17	0,430	0,450	0,460	0,480	0,490	0,470
UST 26 and PIT 17, α,β decrease	0,493	0,459	0,418	0,419	0,436	0,454

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[10] The share of shadow sector output in the sum of state and market sector outputs

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