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ADDRESSING INEQUALITY AND POVERTY WITH TAX INSTRUMENTS

ABSTRACT: *There is a consensus, in both academia and economic policy circles, that the reform of the personal income tax system in Serbia is necessary one. Two frequently discussed reform scenarios are East European style flat tax and the comprehensive income tax model of Western Europe. Most Central and Eastern European (CEE) countries have recently reformed their income tax systems by introducing some form of flat tax scheme, while in numerous countries of Western Europe the possibility of flat tax reform is also seriously considered. Opponents of the reform usually stress the adverse distributional effects of flat tax schemes. The aim of our paper is to contribute to the empirical literature on the distributional effects of alternative tax reform scenarios. The analysis is based on*

the tax and benefit micro-simulation model for Serbia (SRMOD). The results suggest that redesigning the existing income tax system so as to introduce a uniform tax rate and increase the basic allowance would somewhat reduce inequality and improve vertical inequity in taxation. On the other hand, in the case of the introduction of comprehensive income tax, considerably larger equalizing and progressivity effects would be achieved. At the same time, since in both cases redistribution will not affect the bottom decile group, no significant effects (in either cases) on poverty reduction will be achieved.

KEY WORDS: *income tax reform, redistribution, inequality, poverty, microsimulation*

JEL CLASSIFICATION: C63, D31, H23, H24, I32

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1. INTRODUCTION

Fundamental tax reforms have been on the political agenda during the last couple of years in many Western European countries. Since the publication of Hall and Rabushka's (1995) paper there has been a lively debate in academic and policy circles on options to make the tax system more simple and efficient by introducing flat tax schemes. Unlike Western European countries, which still mostly apply some form of comprehensive or (semi) dual income tax, over the last decade many CEE countries have actually introduced some form of flat tax scheme. The primary aim was to simplify existing tax systems, but also to accelerate economic growth. In Russia there was a noticeable increase in tax compliance following the reform (Ivanova et al., 2005), whereas in Slovakia the simplification of the tax law has improved its transparency and business-friendliness. Soon after, the country's credit rating was upgraded (to A, assessed by Standard & Poor) and became the best in the CEE region (Sklenar and Burger, 2006).

At the beginning of the 1990s, due to increasing capital mobility and capital income tax evasion (particularly dividend and interest), Nordic countries performed dualization of their income tax system. This implied introduction of a flat tax rate on income from capital, and progressive tax rates on labour income. This model of income tax reform was aimed at increasing national savings and inflow of capital from abroad, and reducing tax compliance and tax administration costs, since the number of annual income tax returns declined. A similar approach (of introduction of some form of semi-dual income tax) was also analyzed and undertaken in some other European countries (Slovenia, Hungary, the Netherlands, etc.) in the mid-2000s. However, for the purpose of this paper we will focus solely on flat tax and comprehensive income tax.

Flat tax reforms are usually expected to have a positive effect on efficiency, GDP growth, and employment. On the other hand, opponents of the reform usually stress the adverse distributional effects of flat tax schemes. It is often argued that the flat tax scheme is less efficient in tackling inequality than the comprehensive income tax system. Since none of the Western European countries (except Iceland) have yet introduced a flat tax scheme, the economic and distributional consequences of potential reforms have usually been analyzed by using simulation techniques.

The intention of our paper is to contribute to the empirical literature on the distributional and poverty effects of flat tax and comprehensive income tax, by focusing on recent income tax reform proposals in Serbia. The aim of our

empirical research is to determine if the difference in the size of the distributional effects of these two income tax models is sufficiently large to affect the final decision on the income tax reform scenario to be implemented. We analyse the effects of revenue neutral tax reforms on income inequality and (vertical) equity in taxation. We also investigate the potential effects of these reform scenarios on poverty. Our analysis is based on a tax and benefit micro-simulation model for Serbia (SRMOD). All scenarios assume full compliance, and as such do not estimate potential changes in tax evasion.

With its socio-demographic structure, Serbia is often regarded as a typical Western Balkan country. Given that the tax and benefit systems of these economies share many common features, especially among former Yugoslav republics, the qualitative results of our analysis could be of interest to a wide range of countries in the region.

Our main results suggest that replacing the current income tax structure by a flat tax scheme would somewhat reduce inequality and improve vertical equity. However, when comprehensive income tax is introduced, we observe considerably larger equalizing effects. At the same time, since in both cases redistribution will not affect the bottom decile group, we do not observe any significant effects (in either case) on poverty reduction.

The paper is arranged as follows. Section 2 gives an overview of the empirical literature on the distributive effects of income tax reforms. Section 3 describes the data and explains the methodology. A short preview of the current personal income tax system and proposed income tax reform scenarios is presented in Section 4. The distributional effects of these reform scenarios are given in Section 5, and the poverty effects in Section 6. The last section concludes.

2. DISTRIBUTIONAL EFFECTS OF INCOME TAX REFORM IN THE LITERATURE

Empirical studies performed in developed countries that apply comprehensive (strongly progressive) income tax systems have found that replacing current tax schemes with the flat tax model would generate considerable negative effects in income distribution. Decoster et al. (2008), using the European tax-and-benefit micro-simulation model (EUROMOD), show that introduction of a flat tax would reduce the progressivity of the Belgian tax system. The lowest income deciles would lose out, while the higher income earners would gain from the reform. On the other hand, after additionally applying a micro-econometric labour supply

model, they observe some positive labour supply incentives. Gains in efficiency, according to their estimates, are not sufficiently high to offset the adverse effects on income distribution.

In a study for the Netherlands, Jacobs, et al (2007), using the applied general equilibrium model, find that non-linear income tax is more efficient than a linear (flat) tax in achieving redistributive goals. Also, if a flat tax is designed to maintain the current level of inequality it would trigger a negative labour supply response, and vice versa. In a similar manner, using US data, Diaz-Gimenez and Pijoan-Mas (2006) have studied two revenue-neutral flat-tax reform scenarios. These scenarios differ in the tax rates and in the amounts of exemptions. The authors conclude that the less progressive flat-tax scenario would be more efficient than the current tax system, since it would lead to higher output and labour productivity. Improved efficiency would, however, come at the price of more unequal distribution of earnings and after-tax income. In a study based on a simulation model for the German tax and transfer system, Fuest et al (2008) find that in both flat tax scenarios (which were subject to research) the top income decile benefits at the expense of the upper middle class.

Studies in the new EU member states confirm prior results. Paulus et al (2009a) have simulated in EUROMOD different flat tax scenarios for Estonia, Hungary, and Slovenia. Their results indicate that in Hungary and Slovenia the introduction of the flat tax schemes would significantly increase the tax burden on the bottom deciles. Additionally, tax reform would increase inequality and poverty in both countries. The impact on inequality and poverty would not be so pronounced in Estonia since the country already has implemented some form of flat tax system and has a relatively high level of inequality. At the same time it is estimated that flat tax reforms would reduce effective marginal tax rates by 4-9 percentage points, which could improve work incentives or lead to higher tax compliance.

3. DATA AND METHODOLOGY

During the last decades Public Economics literature has developed very useful tools to analyse and evaluate the equity and efficiency effects of tax and benefit reforms. On the one hand, the theoretical analysis has experienced substantial progress with the appearance of the Mirrlees model of optimum taxation. This model provides a key framework for identifying the elements that determine the effects of direct taxes and cash benefits on equity and efficiency. At the same time,

development of the tax-benefit microsimulation models and the labour-supply models have enabled high-quality empirical research (Atkinson, 2009)

To evaluate the effects of income tax reform on inequality and equity we use the tax and benefit microsimulation model for Serbia (SRMOD), which is based on the EUROMOD platform¹. Like other tax-benefit models, SRMOD operates on micro-data for a representative sample of households, within the population to be observed. The Living Standards Measurement Survey (LSMS) from 2007 is currently used as the SRMOD dataset. This dataset was chosen since it includes detailed information both on various sources of income and on paid taxes and claimed benefits². This allows micro-validation (comparison of simulated and real values of benefits at the household level) to be conducted with greater accuracy, thus enabling a more reliable estimate of the model's conformity with the actual tax system and benefit policy. Using elements of income from the survey data and combining them with simulated taxes and benefits, the model calculates disposable income for each household (see Scheme 1). The basic SRMOD output therefore consists of information on changes in disposable income of households after certain policy reforms are introduced. The model shows distribution of household original and disposable income, and the tax-benefit components of these incomes by deciles.³ Additional statistics provided in the model include the percentage of people below the poverty line (headcount ratio) for the overall population and for selected groups, and the Gini coefficient for equivalent original and disposable income.

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- 1 EUROMOD is the tax and benefit microsimulation model for the European Union, developed and maintained by the micro-simulation unit of the Institute for Social and Economic Research (ISER), University of Essex. More details are available at: <http://www.iser.essex.ac.uk/research/euromod>. For more details about SRMOD construction, see Žarković-Rakić (2010).
 - 2 For example, in the LSMS the receipt of social assistance, unemployment benefit, and maternity leave benefit is reported separately, whereas in the Household Budget Survey there is only one question regarding the receipt of these three benefits.
 - 3 Decile groups are formed by ranking according to equalised household disposable income using the modified OECD equivalence scale and weighted by household size.

Scheme 1. Main Income Concepts in EUROMOD

<i>Original income</i> (employment and self-employment income, income from agriculture, income from capital, income from property (rent))
+ <i>Social benefits</i> (family benefits, pensions, unemployment benefit, social assistance benefits, housing benefits)
– <i>Social Insurance Contributions</i> (employee, self-employed)
– <i>Personal Taxes</i> (income and other direct taxes)
= Disposable Income

Source: Paulus et al. (2009b)

Since the baseline tax-benefit policy year and income data reference period are the same, there was no need for income uprating. The only modification to the original dataset was net-to-gross imputations: since the original dataset recorded incomes net of taxes, we have performed tax-benefit calculations in order to compute gross incomes.

4. PERSONAL INCOME TAX IN SERBIA – THE CURRENT SITUATION AND PROPOSED REFORM SCENARIOS

In Serbia combined income tax with a strong scheduler (proportional) component is applied, which is different from developed countries where some form of comprehensive income tax system (with progressive tax brackets) exists. Since 2000 there has been a thorough reform of almost all major taxes in Serbia. Radical changes have been made in sales tax (VAT introduced), excise duties, social security contributions, and corporate income tax. Although the new Personal Income Tax Law was adopted in 2001, no fundamental changes have been introduced. Therefore, in Serbia the so-called combined income tax system (a mix of scheduler and comprehensive income tax) still applies. It is commonly accepted, in both academia and policy circles, that the reform of the personal income tax system in Serbia is necessary. Two frequently discussed reform scenarios are the East European style flat tax and the comprehensive income tax model. In its pure theoretical (Hall-Rabushka) form, a flat tax regime implies that income from labour is taxed at a flat rate (without exemptions and allowances, other than personal exemptions), whereas income from capital is exempted, in order to eliminate double taxation. In practice, however, most Central and East European flat tax countries have also included capital income in the tax base. At the same time, in some of them the tax exemptions list is extended by certain allowances for dependent family members.

A baseline scenario in our microsimulation analysis refers to the personal tax system which was in force in Serbia in 2007 (since the data set is related to 2007). After 2007 certain non- crucial amendments to the income tax system were made⁴. As mentioned above, since 2001 in Serbia the combined income tax model has applied (a combination of strong scheduler and comprehensive income tax). This means that incomes from various sources are taxed at the moment they are generated, at different tax rates (see Table 1).

Table 1. Personal Income Tax Rates in Serbia

<i>Source of income</i>	<i>Statutory rate (%)</i>	<i>Deductible costs/ non-taxable amounts</i>	<i>Effective tax rates (%)</i>
Income from self-employment	10	-	10
Salary/wage	12	non-taxable limit - RSD 5,050	10.4 ¹
Income from agriculture and forestry	14	-	14
Income from authorship rights, related rights, and intellectual property rights	20	34%, 43%, 50%	10, 11.4, 13.2
Income from capital	20	-	0, 16, 20 ²
Income from immovable property	20	20%	16
Capital gains	20	-	0, 20
Other income	20	20%	16
1) Effective tax rate on average monthly salary in Serbia paid in April 2007			
2) Interest on dinar deposits are tax exempted. Dividends received by residents are taxed at the rate of 20%, on the tax base equal to 80% of gross dividend (i.e., effective tax rate is 16%).			

Source: Personal Income Tax Law

Individuals whose total annual income exceeds a certain threshold (three times the average annual salary in Serbia) are also obliged to pay annual income tax at progressive tax rates (10% and 15%). Since less than 1% of the total number of taxpayers actually pays the annual income tax, the equalizing capacity of annual income tax is very low.

The LSMS contains data on individuals' income generated in one month. Since personal income levels may differ during the year due to seasonality, accurate

⁴ In 2010 deductible costs for calculation of tax on income from authorship rights were changed, and tax rates on income from capital and capital gains were reduced to 10%.

modelling of annual income tax in SRMOD was not feasible. However, given the fact that a negligibly small share of taxpayers actually pay annual income tax in Serbia, we believe that omitting to simulate this component of the tax system did not make it much different from the real tax schedule. Finally, since more than three quarters of individuals' total income in Serbia stems from employment (in the form of salary/wage) and that for the most taxpayers salary tax represents their final income tax payment, the current system in Serbia may be regarded as a form of flat tax.

Although several options for reform of personal income tax in Serbia are being discussed, our microsimulation analysis will be focused on two scenarios: redesigned flat tax and comprehensive income tax.

Flat rate taxes may differ considerably in their design. Only flat tax without any tax relief can be regarded as a "pure" flat tax, as in this case tax payments are proportional to incomes. At present only Georgia and Bulgaria have flat income tax as such. In all other cases a flat rate personal income tax is an indirectly progressive tax schedule with a basic tax allowance and a uniform marginal tax rate (Fuest et al, 2008). Design of a hypothetical tax reform scenario crucially depends on the objective of the reform. Given that in this paper we focus on ways to improve income equality using tax policy instruments, we decided to almost double the zero tax bracket (as compared to the current baseline scenario). The allowance of RSD 9,000 now equals the absolute poverty line estimated for 2007, based on LSMS data. Moreover, looking at the actual design of flat tax policy (in Estonia, for example) and/or flat tax reform scenarios simulated in the work of Decoster et al (2008) and Paulus et al (2009a), we opted for additional allowances for dependants to the amount of RSD 4,000 (per child). Finally, the revenue neutrality requirement imposed in similar studies (Davies and Hoy (2002); Decoster et. al (2008), Paulus et. al (2009a), Diaz-Gimenez and Pijoan-Mas, (2006), Fuest et al. 2008) implies a uniform tax rate of 15%.

A comprehensive income tax reform scenario has also been discussed in academia and policy circles. Bearing in mind the subject matter of our paper and the fact that the vertical equity of the current tax system in Serbia is judged to be very low, our reform scenario is the following: family income from all sources, decreased by the basic monthly allowance of RSD 8,000 (per earner), the monthly allowance for dependent children of RSD 4,000 (per child), and itemized deductions for the full amount of medical educational expenses (up to RSD 4,000 per month), is taxed at the progressive tax rates of 12% and 22%. The rate of 12% is applied to family taxable income up to RSD 35,000, while the exceeding amount is taxed at

the rate of 22%. This reform scenario is also designed to yield equal tax revenue as the baseline scenario.

5. DISTRIBUTIONAL EFFECTS

The analysis of the distributional effects of tax reform should answer two questions:

- a) What would be the impact of each of these reform scenarios on inequality? This topic is to be analysed based on the value of the Gini coefficient, as the standard measure of inequality.
- b) If the redistribution takes place, who will be better off and who will be worse off? This question will be answered based on the changes in disposable income across the deciles, after each of the reform scenarios is implemented.

Since the effects of income tax on inequality are highly dependent on the level of progressivity of the tax system, we will also analyse the potential effects of each of these reform scenarios on progressivity.

5.1. Effects of income tax reform on inequality – Gini-based approach

The information on the Gini coefficient (measured on the basis of disposable income) illustrates total income inequality in the country, which is the result of market processes and public policies. However, the analysis of effectiveness of tax and benefit policies (which serves as the information base for the policy making process) may be derived from the data on the structure of the Gini coefficient, i.e., from the data on the effects of particular policy instruments on the Gini coefficient.

Table 2. Effects of tax and benefit policies on the Gini coefficient

	<i>Current income tax system</i>	<i>Flat tax</i>	<i>Comprehensive income tax</i>
Gini coefficient – original income	0.470	0.470	0.470
- effects of income tax on Gini	-0.008	-0.012	-0.015
- effects of social contributions on Gini	-0.003	-0.004	-0.005
- effects of benefits on Gini	-0.108	-0.107	-0.107
Gini coefficient - disposable income	0.351	0.347	0.343

Source: Authors' calculations in SRMOD

The results presented in Table 2 indicate that inequality stemming from market processes is relatively high, but still within the range of other European countries: the Gini coefficient measured on the basis of original (market) income amounts to 0.47. At the same time the average before-tax and before-transfers “market income” Gini coefficient in developed countries ranges between 0.34 and 0.54 (average value is 0.44). The results also suggest that the tax and benefit policies in Serbia make a significant impact on reduction of inequality of income distribution, i.e., total inequality (measured based on disposable income) is reduced by approximately 25%. However, according to the data for OECD countries, tax and benefit policies in these countries cut the Gini coefficient by approximately 33%, which suggests that there is a room for further improvement in the redistributive features of Serbian tax and benefit policies.

The structure of the Gini coefficient in Serbia suggests that social assistance (benefit) policies are far more efficient in reducing inequality than the tax policy instrument, which is in line with results in other European countries. As a result of benefit policies the Gini coefficient in Serbia is reduced by approximately 0.108, whereas income tax and social contributions trigger a decline in the Gini coefficient of 0.008 and 0.003 respectively.

Our result shows that redesigning the current PIT system to introduce a uniform tax rate of 15% and increase the general allowance to RSD 9,000 would considerably increase the redistributive effects of income tax (the effect of income tax on the decline of the Gini coefficient would increase to 0.012).⁵ On the other hand, introduction of a comprehensive income tax system would trigger even larger redistributive effects, since under that scenario the income tax would trigger a fall in the Gini coefficient of 0.015. This means that comprehensive income tax would perform much better than flat tax in terms of redistribution and inequality reduction. However, the difference would not be significant, in absolute terms.

We should keep in mind that the equalizing effects of the personal income tax system in Serbia, both the current one and the proposed tax reform scenarios, are considerably lower than in EU countries. The data for 19 EU member countries (included in the EUROMOD system) show that, on average, income tax systems in these countries reduce the Gini coefficient by 0.044 (Paulus et al, 2009b), which

⁵ These results are in line with the results for other flat tax countries (e.g., Estonia does not show a significantly smaller equalizing effect of personal income tax in comparison with other countries). See Paulus et al (2009a)

is approximately nine times more than the current PIT system in Serbia does, and three to four times more than proposed tax systems would generate. This implies that, if the intention of the tax reform is to address inequality in the country, actual reform scenarios should be even more progressive than the current policy propositions.

5.2. Effects of income tax reform on inequality – income composition approach

The analysis of the redistribution effects of tax reform based on the Gini coefficient provides information on the size and direction of changes in inequality, but still provides no information on the losers and winners from the reform. This can be determined based on the information on the change in income distribution before and after tax reform across the deciles.

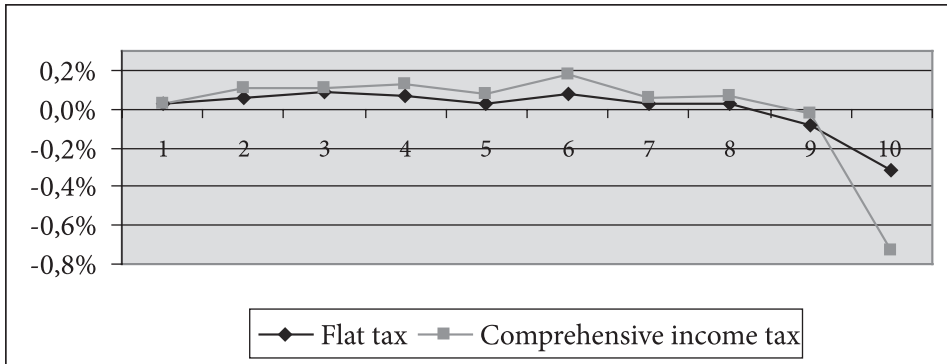
Table 3. Income distribution per decile

	<i>% of total disposable income</i>		
	<i>Current income tax system</i>	<i>Flat tax</i>	<i>Comprehensive income tax</i>
Quintile share ratio (80/20)	6.98	6.82	6.71
1	1.9	2.0	2.0
2	4.0	4.1	4.1
3	5.4	5.5	5.5
4	6.8	6.8	6.9
5	8.0	8.0	8.1
6	9.1	9.1	9.2
7	10.7	10.7	10.7
8	12.6	12.6	12.7
9	15.5	15.5	15.5
10	26.0	25.7	25.3

Source: Authors' calculations in SRMOD

According to the results of our microsimulation analysis, under the current PIT scheme in Serbia the three bottom decile groups possess approximately 11.4% of the total disposable income, whereas the top three deciles generate 54.1% of total disposable income (see Table 3).

Graph 1: Change in disposable income per decile groups after tax reform



Source: Authors' calculations in SRMOD

However, replacement of the currently applied PIT system with a flat tax would trigger redistribution of 0.4% of total disposable income (see Graph 1). Individuals in decile groups 2, 3, 4, and 6 would be better off after the flat tax reform, while individuals in decile groups 9 and 10 would be worse off (their disposable income would decline by 0.1% and 0.3% of total disposable income respectively). On the other hand, in the case of introduction of comprehensive income tax, 0.7% of total disposable income would be redistributed and the full burden of redistribution would be borne by the richest individuals (those in the top decile). At the same time, benefits from the redistribution would be almost equally distributed across decile groups 2 to 8. The results depicted in Graph 1 also indicate that under both tax reform scenarios the disposable income of the bottom decile group remains unchanged. This is due to offsetting the effects of an increase in tax rates and increase/introduction of the basic allowance, dependent children allowances, and itemized deductions.

These results suggest that, under both reform scenarios, the redistribution will be performed at the expense of the richest and for the benefit of the middle class. The only significant difference between these two reform scenarios refers to the size of redistribution. A larger amount of income would be redistributed after the introduction of the comprehensive income tax scheme than in the case of flat tax reform.

The conclusion on the positive redistributive effects of tax reform is also confirmed by the quintile share ratio 80/20⁶. The ratio would decline from 6.98 before tax

⁶ This ratio equals total income disposable to the top two deciles divided by total income disposable to the bottom two deciles.

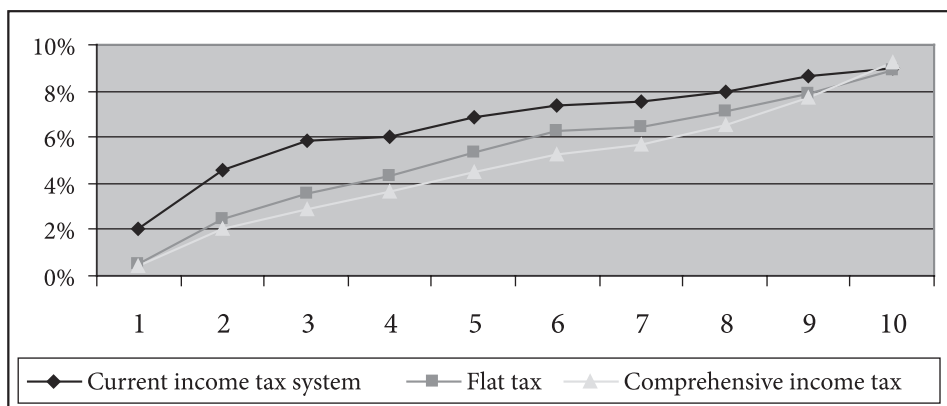
reform to 6.82 after the flat tax reform or to 6.72 under comprehensive income tax reform. This also implies that comprehensive income tax would bring a larger decrease in inequality than the flat tax reform scenario.

The reform of income tax would change the Effective Marginal Tax Rate (EMTR), both average and across deciles, which is associated with the change in tax evasion. Since it is expected that comprehensive income tax would trigger a larger change (probably a decline) in the EMTR than flat tax, we believe that this would result in a larger decrease in tax evasion than in the case of flat tax reform. Given that the elasticity of non-reported income to EMTR is usually small (below 0.5) and the changes in EMTRs due to tax reforms are expected to be modest, it is our estimate that taking into account tax evasion response would not change the major conclusions related to the inequality effects of these two reform scenarios.

5.3. Progressivity of income tax before and after reform

The redistributive power of income tax stems from the progressivity level, which is also regarded as an indicator of vertical equity in taxation. The common approach to evaluation of vertical equity in taxation refers to computation and the analysis of tax progressivity. Although there are many different methods for measurement of tax progressivity, we will focus on the two approaches usually applied in contemporary empirical studies: pattern of average tax rate (ATR) by income level and standard progressivity indices.

Graph 2: Average tax rate per decile groups



Source: Authors' calculations in SRMOD

Progressivity is defined as the situation when increase in income level is associated with a rise in average tax rate (ratio of tax liability and gross income). Therefore, the slope of the average tax rate/income may be used as a rough indicator of the progressivity of income tax (the higher the slope is, the greater the progressivity level).

Since the slope of the ATR/income curve is higher for flat tax reform compared to the current income tax system, it can be concluded that introduction of the flat tax would increase the progressivity of the tax system (see Graph 2). However, introduction of the comprehensive income tax would imply an even larger increase in progressivity, since the slope of the respective ATR path is even higher than in case of flat tax reform.

This approach is useful for graphical disposition of progressivity of the tax system. However, in order to make precise comparison of progressivity levels across tax policy scenarios, it is necessary to calculate respective progressivity indices. The family of these indices is broad, since each of the particular indicators has certain drawbacks. Therefore, contemporary empirical studies usually exploit two or more complementary measures. For the purpose of the analysis of the level of tax progressivity in this paper we have selected the two most commonly used indicators: the Musgrave-Thin index and Kakwani index.

The Musgrave-Thin progressivity index (P_{MT} index) belongs to the family of progressivity indices which are based on the Gini coefficient. If $G(x^n)$ stands for the post-tax Gini coefficient, while $G(x^g)$ is the pre-tax Gini coefficient, the Musgrave-Thin index is calculated in the following manner:

$$P_{MT} = \frac{1 - G(x^n)}{1 - G(x^g)} \quad (1)$$

Critical value of P_{MT} index is 1, which indicates that the tax system is proportional. If the value of P_{MT} index exceeds 1, the tax system is regarded as progressive (the higher P_{MT} index is, the more progressive is the system), while in case the P_{MT} index is below 1, the system is regressive.

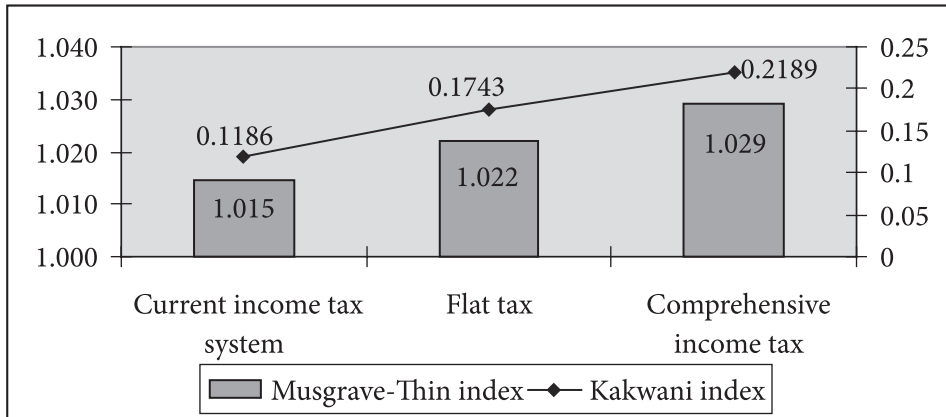
The Kakwani progressivity index is also a progressivity indicator, based on the Gini coefficient and concentration curve. This index is calculated as the difference between tax concentration index (C_T) and pre-tax Gini coefficient $G(x^g)$:⁷

⁷ See: Kakwani. N. (1977)

$$P_K = C_T - G_x \quad (2)$$

The Kakwani tax progressivity index may range from -2 to 1. A positive value of this index indicates that the tax system is progressive.

Graph 3. Effects of income tax reform on progressivity



Source: Authors' calculations in SRMOD

The results that we get based on both progressivity indices are convergent. According to our results, the current PIT system in Serbia is only slightly progressive (P_{MT} only slightly departs from 1, while P_K is close to 0). However, one should bear in mind that the progressivity of the current system would be to some extent higher if we were able to simulate additional annual income tax at progressive tax rates (10% and 15%). Flat tax reform is expected to trigger increase in P_{MT} index to 1.022 (and P_K to 0.1743), which means that the introduction of this reform scenario would increase the progressivity of the Serbian income tax system. These results are somewhat opposed to the results of empirical studies in developed countries, where introduction of the flat tax trigger affects adversely progressivity and income distribution. This difference is owing to the fact that current income tax in Serbia is far less progressive than PIT systems in developed countries.

Although some positive effects on progressivity would be achieved through the introduction of flat tax, the results indicate that switching to the comprehensive income tax model would generate a much larger positive effect on tax progressivity. The introduction of a comprehensive income tax scheme would imply a rise in P_{MT} index to 1.029 (Kakwani to 0.2189). However, the level of tax progressivity

in Serbia would still be significantly lower than in the EU countries, where the average value of the index amounts to 1.0719.⁸

6. POVERTY EFFECTS

The tax system has a pervasive impact on poverty, both directly through its role in the distribution of society's resources, and indirectly through its effects on incentives for economic decisions (like working and saving).

The poverty statistics in this paper are calculated using the assumptions most frequently used in the poverty measurement literature. Differences in household size and composition are dealt with applying the modified OECD equivalence scale⁹ suggested by EUROSTAT.¹⁰

The poverty line is set at 40% of the median of equivalent disposable income in the baseline scenario. The poverty line is fixed and used in both reform scenarios. Poverty incidence, intensity, and severity are measured using the family of measures proposed by Foster, Greer, and Thorbecke (1984), which takes the following form:

$$P^{FGT} = \frac{1}{N} \sum_{i=1}^N \left(1 - \frac{x_i}{l}\right)^\alpha \quad (3)$$

where l is the poverty line, x_i the value of equalized income for the i th person's household, and α is a measure of the sensitivity of the index to poverty. When $\alpha=0$, the FGT index is the headcount index which measures the proportion of the population that is poor. It is popular because it is easy to understand and to measure poverty with it. But it does not indicate how poor the poor are. If $\alpha=1$, FGT becomes the poverty gap index that measures the extent to which individuals fall below the poverty line (the poverty gaps), as a proportion of the poverty line. The poverty gap, however, is not sensitive to distribution of income among the poor. It is the squared poverty gap index, obtained for the $\alpha=2$ values of the FGT index, which takes the inequality among the poor into account.

⁸ See: Peichl, A., et. al. (2008)

⁹ The modified OECD equivalence scale gives weight 1 for the first adult, 0.5 for remaining adults, and 0.3 for children under 14 years of age

¹⁰ For a discussion of using per capita measures instead of equivalence scales in obtaining comparable units of observation for the poverty measurement in Serbia, see Jovicic et al. (2010).

Table 4. Poverty in Serbia under the alternative income tax scenarios

	<i>Baseline</i>	<i>Flat tax</i>	<i>Comprehensive income tax</i>
Headcount ratio	0.13	0.11	0.11
Poverty gap	0.42	0.42	0.42
Squared poverty gap	0.023	0.023	0.023
1) Poverty line is set at 40% of the baseline median			

Source: Authors' calculations in SRMOD

As Table 4 shows, both alternative tax reform scenarios would reduce the number of poor in the population from 13% to 11%. The depth of poverty, as shown by the poverty gap, and poverty severity, expressed by the squared poverty gap, would remain unchanged. In this respect, both reform scenarios would have the same effect since neither of them leads to an increase in the disposable income of people in the bottom decile.

Next, we explore whether the changes affect any specific age group in particular. As Table 5 shows, poverty decreases by the same amount under both tax reform scenarios for the children and working population between 45 and 64 years of age. These effects are generated due to the introduction of monthly allowances for dependent children of RSD 4,000 (per child) in both reform scenarios.

Table 5. Poverty rates by age

	<i>Current income tax system</i>	<i>Flat tax</i>	<i>Comprehensive income tax</i>
Total	13		11
0-15	13.5	13.3	13.3
16-29	12.6	12.2	12.2
30-44	11.1	11.1	11.1
45-64	11.9	11.6	11.6
65+	9.2	9.2	9.2
1) Poverty line is set at 40% of baseline median			

Source: Authors' calculations in SRMOD

Although both reform scenarios would somewhat reduce inequality in income distribution, this would only trigger a slight decrease in poverty. The absence of larger poverty effects are due to the fact that the disposable income of the bottom decile group would remain almost unchanged.

7. CONCLUSIONS

Empirical data on the structure of the Gini coefficient and relevant tax progressivity indices suggest that the equalizing effects and vertical equity in taxation under the current income tax regime in Serbia are very limited. These conclusions represent significant additional arguments in favour of income tax reform in Serbia. Although the income tax systems in EU member states are quite heterogeneous, it is evident that all of them apply some form of comprehensive, dual, or flat income tax. In the last decade most of the new EU member states have switched to a flat income tax, expecting to improve economic efficiency and some aspects of equity and to make the tax system simpler.

It is commonly accepted, in academia as well as in policy circles, that reform of the personal income tax system in Serbia is necessary. Two frequently discussed reform options are the East European style flat tax and the comprehensive income tax model. Therefore in this paper we have analysed the effects of such reform scenarios on inequality, poverty, and vertical equity in taxation. Our intention was to provide ex-ante results relevant to evidence-based policy making processes, as well as to contribute to empirical literature on the distributional and poverty reducing effects of income tax reform.

The results show that both reform scenarios would help in tackling inequality. However, in terms of redistribution, as expected, the comprehensive income tax would perform better than the flat tax, due to the larger amount of income to be redistributed under this scheme. We find that flat tax, designed with the intention to be indirectly progressive, would trigger redistribution of income equal to 0.4% of total disposable income. The comprehensive tax model would redistribute 0.7% of total disposable income. Both reform scenarios would imply redistribution from the richest to the middle class, leaving the disposable income of the poorest unchanged.

Our findings also indicate that under both tax reform scenarios tax progressivity/vertical equity in taxation would be improved, which is mostly due to very limited progressivity and degree of vertical equity in the baseline scenario. As in the case of inequality effects, comprehensive income tax would also perform better in terms of progressivity than redesigned flat tax. However, the equalizing effects of the proposed reform scenarios would still be three to four times lower than in the EU countries. This implies that, if the intention of the tax reform is to address inequality in Serbia, actual reform scenarios should be even more progressive than our policy propositions.

The poverty effects of the tax reform scenarios are negligible, due to the fact that equalizing (redistributive) effects of all tax reform scenarios towards the poorest (two bottom deciles) are very limited.

The distributional effects are important, but are not the only criteria that should be taken into account in the economic analysis of optimality of different tax policy models. Such analysis should also encompass the impact of tax reform options on economic efficiency (work and saving incentives), which is an interesting avenue for future research.

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