



Social Welfare Effects of Progressive Income Taxation under Varying Inequality: Evidence from Serbia

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Stylized facts and research motivation

- During the recent global crisis inequality in Serbia posted the sharpest rise (by 4.3pp from 2007 to 2012) in Europe, thus becoming the single largest in the continent
- Decline in real GDP, labour market participation and employment during the crisis was more severe in Serbia, then in other Central and Eastern European (CEE) countries and mostly concentrated at the bottom of distribution



Research question and contributions

Research question:
Have the structural changes in the economy during the crisis (sharp decline in employment, participation and incomes, particularly at the bottom of distribution), and consequently strong rise in inequality created the stronger case for more progressive income taxation in Serbia?

- Contributions of the paper:**
 - Novel approach to optimal taxation analysis - instead of estimating welfare maximizing income tax rates, we compare the social welfare (SW) effects of two tax schemes (flat and progressive), in two periods (before and after the crisis)
 - The first empirical paper on the optimal income taxation in a transition economies (to the best of our knowledge)
 - The first empirical paper to compare the SW effects of progressive taxation before and after the crisis, thus contributing to discussion on the consequences of the crisis for the optimal income tax design

Methodology and data

- We evaluate the SW reaction to shift from flat to progressive income tax before the crisis (in 2007) and after the crisis (in 2012), using data for Serbia (utilitarian vs. egalitarian specification)

$$SW_{it} = \sum_{i=1}^n U_i(Y_i, L_i, Z_i) \quad SW_{it} = \sum_{i=1}^n \mu_i U_i(Y_i, L_i, Z_i) \quad \mu = \begin{cases} 1.5, & 1st \text{ quintile} \\ 1, & 2nd - 5th \text{ quintile} \end{cases}$$

Steps:

- Estimating the income-leisure utility function (UF) in 2007 and 2012 (maximum likelihood estimation applied on the conditional logit function), following the approach of van Soest (1995) and Blundell et al (2000) – separately for singles and couples

UF: singles

$$U_{ij} = \alpha_1 Y_{ijk} + \alpha_2 Y_{ijk}^2 + \alpha_3 L_j + \alpha_4 L_j^2 + \alpha_5 N_j + \alpha_6 L_j + \beta_1 X_i + v_{ji} \quad i = 1, 2, \dots, n; \quad j = 0, 20, 40, 50; \quad k = N, I, F$$

UF: couples

$$U_{ijk} = \alpha_1 Y_{ijk} + \alpha_2 Y_{ijk}^2 + \alpha_3 L_{ij} + \alpha_4 L_{ij}^2 + \alpha_5 L_{ij} + \alpha_6 L_{ij}^2 + \alpha_7 L_j + \alpha_8 L_m + \beta_1 X_i + v_{ji} \quad i = 1, 2, \dots, n; \quad j = 0, 40(I), 40(F), 50(F); \quad k = I, N, F;$$

- Deterministic part of the utility function consist of: disposable income (Y_{ijk}); The leisure variable (L_j); The sectoral choice (k): N_i (non-participation) or I_j (work in informal sector); Interaction (X_i) of main variables
- Following Bourguignon and Gurgand (2001) the stochastic part of the utility function (v_{ji}) is estimated, by making 200 random draws from the Halton distributions
- Discrete choices limited by empirical distribution of working hours by sectors. Individuals under the age of 18 and over the age of 64, students, pensioners, persons with disability and women on maternity leave, as well the agricultural workers and unpaid family members are dropped from the sample. The final sample includes 7,573 individuals in 2007 and 8,839 individuals in 2012

- Introducing progressive tax in 2007 and 2012 and simulating the new budget constraints, using the tax-benefit microsimulation model (SRMOD).

- In order to ensure comparability, all scenarios yield the same revenues and the same degree of progressivity

Tax reform scenarios	2007		2012	
	Flat tax	Progressive tax	Flat tax	Progressive tax
<0.5 AW	10.5	0	10.6	0
0.5 AW - 1 AW	10.5	15.3	10.6	15.1
1 AW - 1.5 AW	10.5	21	10.6	23
1.5 AW - 3 AW	10.5	31	10.6	33
> 3 AW	10.5	41	10.6	43
RE index	0.750	2.6	0.86	2.6

- Estimating the labour supply (LS) response to new budget, based on the estimated income-leisure preferences and the new budget constraints

- Estimating the new income-hours sets and the individual level utilities associated with the new income-hours sets

- Calculating and comparing the total SW under progressive and flat tax in both years

Data:

- 2007: Living Standard Measurement Survey (LSMS) - 5,575 households (17,735 individuals)
- 2012: Survey on Income and Living Conditions (SILC) - 6,501 households (20,069 individuals)

Results: UF and LS elasticities

VARIABLES	2007		2012	
	coef.	se	coef.	se
Disposable income	0.586***	(0.120)	0.369***	(0.103)
Disposable income*Age	0.001	(0.002)	0.005***	(0.002)
Disposable income*Married	0.040	(0.041)	0.006***	(0.028)
Disposable income*Preschool children	0.263***	(0.067)	0.153***	(0.041)
Disposable income*Squared	-1.557***	(0.411)	-0.473***	(0.126)
Leisure	0.239***	(0.050)	0.540***	(0.071)
Leisure*Age	0.001***	(0.002)	0.002***	(0.002)
Leisure squared	-0.353***	(0.060)	-0.716***	(0.032)
Informal employment	-1.769***	(0.160)	-0.849***	(0.079)
Informal employment part time	1.976***	(0.191)	2.221***	(0.182)
Informal employment*Female	-0.908***	(0.176)	-1.035***	(0.123)
Non-participants	8.309***	(0.294)	13.803***	(0.794)
Non-participants*Age	-0.023***	(0.006)	-0.042***	(0.009)
Non-participants*Preschool children*Female	0.836***	(0.191)	0.861***	(0.181)
Observations	21,352		28,112	
r ² , p	0.26		0.3	
F	42.246		49.000	

VARIABLES	2007		2012	
	coef.	se	coef.	se
Disposable income	2.147***	(0.233)	1.407***	(0.149)
Disposable income*Leisure - women	-6.164***	(0.502)	-0.000***	(0.001)
Disposable income*Leisure - men	-0.006***	(0.001)	-0.006***	(0.001)
Disposable income*Age - women	-0.003***	(0.001)	-0.006***	(0.001)
Disposable income*Squared	-0.008***	(0.002)	-1.746***	(0.406)
Leisure - women	0.273***	(0.023)	0.386***	(0.022)
Leisure squared - women	-0.181***	(0.027)	-0.272***	(0.017)
Leisure - men	0.088***	(0.016)	0.208***	(0.009)
Leisure squared - men	-0.071***	(0.016)	-0.001***	(0.002)
Leisure - men*Age - men	0.001***	(0.002)	-0.162***	(0.014)
Informal employment - women	-2.250***	(0.137)	-1.688***	(0.106)
Informal employment - men	-1.310***	(0.086)	-0.793***	(0.047)
Non-participants - women*Preschool children	0.644***	(0.124)	0.499***	(0.111)
Observations	33,232		36,960	
r ² , p	0.17		0.17	
F	19.096		19.096	

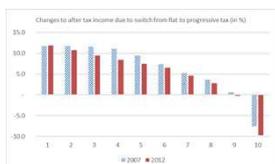
- UF parameters estimation - main points:
 - Positive utility of income and leisure in 2007 and 2012
 - Marginal utility of income diminishing
 - Marginal utility of leisure also diminishing

Labour supply elasticities	singles		couples	
	2007	2012	2007	2012
Labour supply elasticity at extensive margin	0.418	0.827	0.489	0.739
Labour supply elasticity at intensive margin	0.034	0.062	0.033	0.043
Formal-informal work elasticity	0.168	0.372	0.199	0.320

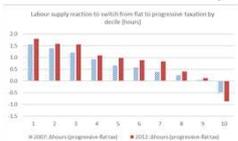
- LS elasticities:
 - LS elasticities larger in 2012 than in 2007: finding consistent with the recent empirical studies on the USA (Heim, 1997) and USA and Europe (Bargain et al (2011))
 - Heim (2007) explains decline in female labour supply elasticity by the change in the cross-cohort preferences towards work

Results: redistribution, LS reaction and social welfare effects

- Tax reform (shift from flat to progressive scheme) triggers redistribution from 10th decile to lower income levels

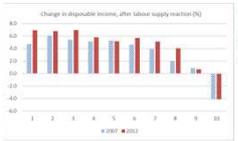


- Total working hours rise in both years (due to strong activation at the bottom of distribution), the effects being slightly larger in 2012



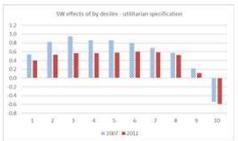
Year	Variable	Observations (weighted)	Mean (weeks)	
			2007	2012
2007	Progressive tax	3,295,124	28.46	2,348,288
	Difference (progressive-flat tax)		8.45	53,842
2012	Flat tax	3,151,270	29.25	2,038,879
	Difference (progressive-flat tax)		0.84	66,025

- Redistribution of income after the behavioural response is stronger than in static terms, due to progressive LS reaction



Effects of tax reform on Gini coefficient (in pp)		2007	2012
ΔGini - due to rise in tax progressivity		-1.4	-1.4
ΔGini - due to labour supply reaction		-0.4	-0.7
ΔGini - total		-1.8	-2.1

- In both years the SW effects would be positive - income and redistribution effects prevail over the disutility of work effect



Year	Variable	Observations (weighted)	Mean utility		Total social welfare	
			2007	2012	Utilitarian specification	Egalitarian
2007	Flat tax	3,295,124	22.78	75,081,164	74,838,261	
	Progressive tax	3,295,124	22.91	76,402,474	75,205,288	
2012	Difference (progressive-flat tax), in %		0.58	0.58	0.57	
	Flat tax	3,151,270	23.23	73,203,071	73,059,587	
2012	Progressive tax	3,151,270	23.32	73,481,089	73,918,681	
	Difference (progressive-flat tax)		0.38	0.38		

Conclusion

- Shift from flat to progressive taxation would affect the social welfare function through three countervailing channels:
 - Negative effect: rise in working (disutility of work)
 - Positive effects: rise in income due to increase in the working hours (positive utility of income) and progressive redistribution of income (diminishing marginal utility of income)
- In both years increase in progressivity would have positive effects on social welfare, the effects being slightly stronger in 2012 than in 2007, due to larger LS reaction at the lower part of income distribution
- Limitations: non-labour effects (savings, human capital formation, output etc.) not taken into account, labour demand constraint, etc.
- Further steps: introducing other forms of the social welfare function specification or compensated variation approach; introducing other European countries, with similar development pattern during the crisis, etc.