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Switching personal income tax and social security contributions between Slovenia and the Federation of Bosnia and Herzegovina

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ABSTRACT

This article examines policy switching between Slovenia and the Federation of Bosnia and Herzegovina (FBH). The idea behind it is that national microsimulation models can be used to apply Slovenian parameters to the FBH data, as established by the Personal Income Tax (PIT) Act and Social Security Contributions (SSC) Act. Accordingly, we introduce FBH parameters to Slovenian data. Along these lines, we investigate the effects on public finance systems with respect to revenues from PIT and SSC, average after-tax income, tax progressivity, income inequality, and the redistributive effect in each of these two countries, using the other country's PIT and SSC solutions. This is the first fiscal comparison of Slovenia and the FBH, as well as the first policy switching analysis of the two countries.

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1. Introduction

Slovenia and Bosnia and Herzegovina have been experiencing several tax reforms over the past two decades. With the breakup of the former Yugoslavia, Slovenia immediately started a reform of Personal Income Tax (PIT), introducing a comprehensive system at the beginning of the 1990s, which is still used and currently has four tax brackets and the highest marginal tax rate of 41%. On the other hand, the Federation of Bosnia and Herzegovina (FBH), as one part of Bosnia and Herzegovina,¹ proceeded slower and introduced a reformed PIT with a flat 10% rate only in 2009. The system of social security contributions (SSC) in Slovenia has been more or less unchanged since 2002, with the employer (16.1%) and employee (22.1%) rates of SSC remaining unchanged. In the FBH, the SSC Act that was introduced in the 1990s is also still in effect, currently with the employer 10.5% rate and employee 31% rate.

Social, political and economic development was almost incomparable between the two countries during the last two decades, as it was radically shaped in the FBH by the war in the 1990s. Consequently, the current tax systems in both countries are different and hardly resemble the common ex-Yugoslavian basis. While Slovenia shaped its tax

system towards a highly progressive PIT (Čok, Sambt, Košak, Verbič, & Majcen, 2012; Majcen, Verbič, Bayar, & Čok, 2009), the FBH accepted a flat PIT concept. SSC also experienced divergent movements: ratio between the employers (10.5%) and employee rate (31.0%) in the FBH is more biased towards the employees than in Slovenia (16.1% versus 22.1%).

This article relates these two countries through ‘policy switching.’ The idea behind it is to apply Slovenian PIT and SSC parameters to FBH data. Accordingly, the FBH parameters are applied to Slovenian data. We use national microsimulation models as a tool for this task, to examine the effects on PIT and SSC revenues, the distribution of after-tax income by decile groups, tax progressivity, and income inequality in each of the two countries, by using the other country’s tax parameters. We investigate the effects on tax progressivity and income inequality through the Gini coefficient, concentration indices of after-tax income and taxes, the Kakwani index, and decomposition of the redistributive effect. This is the first policy switching exercise in public finance between Slovenia and Bosnia and Herzegovina.

The results presented in this article show that the underlying distribution of income in one country has an unsustainable effect on the overall results of taxation, when the tax system of the other county is applied. Namely, Slovenian PIT parameters bring higher tax revenues in both cases (applied on Slovenian and FBH data) than the FBH flat PIT system. On the other hand, adapting the Slovenian SSC system parameters results in a lower amount of collected SSC in both cases. Our article thus highlights the consequences of these developments, which are reflected in the distribution of income and taxes from a specific – taxation – point of view, and shows how countries with a once common background can become different in a relatively short period of time. However, since the two countries have so different tax systems, one could expect that people in one country should react if the tax system of the other country is applied. In practice, the results would thus certainly differ from those shown in the article and this represents a limitation of our research.

The rest of the article is organised in three sections. Section 2 discusses the PIT and SSC systems in Slovenia and the FBH. Section 3 explains the methodology of applying another country’s parameters to data, and introduces the Gini coefficient, the Kakwani index, concentration indices, and decomposition of the redistributive effect. The key findings of policy switching between Slovenia and the FBH are discussed in Section 4. Section 5 concludes the article with the main findings.

2. PIT and SSC systems in Slovenia and the FBH

PIT and SSC represent major fiscal sources in both systems. Together, they account for more than half of the total taxes in Slovenia and the FBH, as shown in Table 1. However, there is a difference between the FBH and Slovenia in the size of PIT relative to SSC. PIT in the FBH is proportionally much smaller in relation to SSC, compared with Slovenia. Although the populations of Slovenia and the FBH are roughly similar (around 2 million people), Slovenia has a much more efficient collection of PIT and SSC, expressed as a share of GDP. Therefore, it is obvious that both types of taxes are much lower per capita in the FBH, especially the PIT, which reaches only 0.75% of the national average gross annual wage² (AGAW), while in Slovenia this figure is around seven times higher (5.48% of AGAW).

Let us now outline in brief the similarities and the differences in PIT and SSC systems between Slovenia and the FBH. Sources of income (income subject to tax) that are taxed

Table 1. Revenues in the FBH and Slovenia in 2011.

Type of tax	Amount collected, 2011 (€ bn)		% total taxes, 2011		% GDP, 2011		Tax per capita, 2011 (€)	
	FBH	SLO	FBH	SLO	FBH	SLO	FBH	SLO
PIT	0.13	2.05	4.64	15.6	1.64	5.57	57.18 (0.75% AGAW)	1,002.10 (5.48% AGAW)
SSC	1.35	5.27	46.69	39.9	16.51	14.28	576.67 (7.53% AGAW)	2,569.52 (14.04% AGAW)

Note: AGAW represents the national average gross annual wage.

Source: Federation Ministry of Finance (2012); Federal Institute for Development Programming of the FBH (2012); Tax Administration of the FBH (2012); Ministry of Finance of the Republic of Slovenia (2013).

through the PIT Acts in both countries are: (1) income from dependent activity (employment), (2) income from independent activity (self-employment, contractual work and royalties), (3) income from property and property rights, and (4) income from capital. However, what is considered income from capital in Slovenia is different from that in the FBH. Income from capital in the FBH represents interest on loans and payments based on voluntary life and pension insurance. The Slovenian system covers dividends, capital gains, and interest on savings accounts. These are exempt through the PIT Act in the FBH.

In addition to the sources of income listed above, Slovenia also taxes pensions, whereas the FBH exempts them. However, due to special tax credit for pensions, only a tiny minority of pensions in Slovenia is effectively taxed, and the PIT derived from this source is negligible (approximately 0.60% of overall PIT). Of course, if pensioners from our samples reveal other types of income, they are included in the analysis. Exclusion of pensions influences the size of overall income, as in 2011 pensions represented 10.73% of GDP in Slovenia (Pension & Disability Insurance Institute of Slovenia, 2015) and 10.20% of GDP in the FBH (Audit Office for Public Institutions in the FBH, 2012). Unlike Slovenia, the FBH also taxes some other sources of income through the Personal Income Tax Act, such as, for example, income from contests and games of chance. In order to enable comparison, income from capital, pensions, and income from contests and games of chance are excluded from the analysis. We are aware that this represents a limitation of the research, especially the exclusion of pensions as a major income source for an important part of the population.

The main parameters of PIT and SSC used in the microsimulation are summarised in Table 2. To enable comparison, tax allowances are expressed in terms of the AGAW. Parameters refer to 2011. The reason for choosing this year for the analysis lies in data availability (for calibration of microsimulation models), as well as in the fact that 2011 was the year before the temporary 'anti-crisis' PIT system changes that were introduced in Slovenia.

2.1. Tax allowances

Both countries have a general allowance for all taxpayers. As opposed to the FBH system, Slovenia differentiates three levels of the general tax allowance depending on the level of individual taxpayer's gross income. Taxpayers with higher gross incomes are entitled to claim a lower general tax allowance, this being another element of the PIT progressivity. Regarding the children tax allowance, the FBH treats the third and each subsequent child the same way, whereas Slovenia increases the tax allowance for each subsequent child regardless of how many dependent children a taxpayer has. Children with special needs are treated

Table 2. PIT and SSC parameters in Slovenia and the FBH in 2011.

Provision	Slovenia	FBH
	Tax allowance (as a share of the AGAW)	
General	0.1718 if gross income above 0.6539 0.2299 if gross income between 0.5653 and 0.6539 0.3392 if gross income below 0.5653	0.2403 for all taxpayers
Children	1st 0.1268 2nd 0.1378 3rd 0.2299 4th 0.3219 5th 0.4140 + additional 0.0921 for each subsequent child	1st 0.1202 2nd 0.1682 3rd and each subsequent child 0.2163
Dependent spouse	Same as other dependent family members	0.1202
Other dependent family members	0.1268 for any other dependent family member	0.0721 for any other dependent family member
Children with special needs	1st 0.4594 + additional 0.0920 for each subsequent child with special needs	Same as for other children
Disability	0.9187 only for a taxpayer with 100% disability	0.0721 for any level of disability for a taxpayer and any other dependent family member
Allowance for work while student	0.1718	Exempt up to 0.3333
Income of self-employed journalists and artists	15% allowance for the first €25,000 (1.3664 of AGAW) of income	None
Voluntary supplementary pension insurance	Maximum 0.1467 of AGAW or 5.84% of the individual gross wage (whichever is higher)	Maximum 0.1682 ^a
Life insurance premiums	None	Maximum 0.1682
Medical treatments	None	All costs (unlimited)
Interest for housing loan	None	All costs (unlimited)
Pensions	Tax credit equal to 13.5% of the gross pension	Pensions are not taxed
	Standardised costs (as a % of gross income)	
Contractual work, royalties, work while student	10%	Contractual work: 20% Royalties: 30%
Rents	From property: 40%	From property: 30% From property rented to tourists: 50%
	PIT and SSC rates (in %)	
PIT	Up to 0.4173 of AGAW 16% 0.4173–0.8346 of AGAW 27% Over 0.8346 of AGAW 41%	10%
Employee SSC rate for the employed and self-employed ^b	22.1%	31%
Employer SSC rate for the employed and self-employed	16.1%	10.5%
Employee SSC rate applied to contractual work and royalties	None	4%
Employer SSC rate applied to contractual work and royalties	Contractual work: 31% Royalties: none	6%

^a In the current Personal Income Tax Act in the FBH, tax allowances for voluntary supplementary pension insurance premiums and life insurance premiums are eliminated.

^b The overall rate of 41.5% (31% + 10.5%) is used for the majority of the self-employed in the FBH.

Source: [Personal Income Tax Act in the FBH](#); [Social Security Contributions Act in the FBH](#); [Personal Income Tax Act in Slovenia](#); [Social Security Contributions Act in Slovenia](#).

separately in Slovenia only. Both countries prescribe a tax allowance for adult dependent family members. However, the FBH treats dependent spouses separately from other adult family members and applies different parameters to them.

Disability is considered in both countries, with some differences. Slovenia provides an allowance only for 100% disability of a taxpayer. The FBH also entitles an allowance to those with a lower level of disability and for other disabled dependent family members. Students are eligible to claim a tax allowance up to a certain level of income from working while enrolled as a student in both systems. In 2011, both countries gave taxpayers the right to use a tax allowance for voluntary pension insurance. Afterwards, this provision and the provision that allowed for life insurance premiums were eliminated from the PIT Act in the FBH. The FBH also allows for medical treatments that are not covered by public health insurance and interest on housing loans. Slovenia permits a tax credit for pensions, whereas the FBH does not tax pensions at all.

2.2. Standardised costs

Taxpayers with income from contractual work, royalties, working while a student, and with income from rents may claim standardised costs that are deducted from gross income and reduce their tax base. Both systems permit such costs.

2.3. Tax schedule

Slovenia has a progressive schedule with marginal tax rates of 16, 27, and 41%, whereas the FBH has a single rate of 10%.

2.4. Social security contributions

Both countries have set the rate of SSC for income from employment (and self-employment) as a portion paid by the employer and a portion paid by the employee. In addition, there are also SSC to be paid for contractual work and royalties. The FBH applies both the employer and the employee part of SSC for royalties and contractual work, whereas Slovenia only applies the employer part to contractual work.

Table 3 summarises PIT and SSC parameters that are either excluded from our analysis or adjusted in order to achieve comparability between the two countries. We excluded those tax allowances that appear in one system only, while in the case of a dependent spouse we used ‘allowance for other dependent family members’ for both countries, as Slovenian data do not enable us to identify and separate spouses from other dependent family members. For the same reason, we applied a standardised cost of 30% in FBH for all rents deriving from property, even though rents from property renting to tourists are eligible for a 50% standardised cost. As already mentioned, there are three sources of income that are excluded from our analysis: income from capital, pensions, and income from contests and games of chance.

3. Methodology

3.1. Microsimulation

The microsimulation model (scenario builder, microanalytic simulation) is used for simulating different scenarios in taxation, in our case the PIT and SSC. Development of the

Table 3. PIT and SSC parameters that are excluded from the analysis or adjusted.

Provision	Slovenia	FBH
	Allowance	
Dependent spouse and other dependent family members	Parameter applied for 'other dependent family members'	
Children with special needs		Excluded
Disability (own and dependent family members)		Excluded
Allowance for work while a student		Excluded
Income of self-employed journalists and artists		Excluded
Voluntary supplementary pension insurance		Excluded
Life insurance premiums		Excluded
Medical treatments		Excluded
Interest for housing loan		Excluded
	Standardised costs as a % of gross income	
Rents		From property rented to tourists: 30% instead of 50%
Excluded: income from capital, pensions, and income from contests and games of chance		

Source: Personal Income Tax Act in the FBH; Social Security Contributions Act in the FBH; Personal Income Tax Act in Slovenia; Social Security Contributions Act in Slovenia.

concept of microsimulation modelling started in the 1950s (Michel & Lewis, 1990), and was introduced by Orcutt (1957) as a new type of socioeconomic modelling. Models are generally used to reflect the 'real world'. Policy questions are associated with particular issues, such as revenue implications, redistributive effects, or transfer payments, and those questions should be answered through microsimulation models (Buddelmeyer, Creedy, & Kalb, 2007).

Slovenia and the FBH have national microsimulation models that have been developed outside the governmental institutions. However, those models have been used for government purposes as well. Moreover, this is the first time that the FBHMOD (Microsimulation Model of the FBH) has been used in practice. In this article, we proceed with policy switching between the two countries, through an application of other country's PIT and SSC parameters to local data (Slovenian parameters to FBH data and vice versa) using the national microsimulation models.

The data we use in our research are: (1) for Slovenia gathered from an administrative database prepared by the Statistical Office of the Republic of Slovenia (Administrative Database for Slovenia) that includes a representative sample of 112,000 individuals (Majcen et al., 2012), and (2) for the FBH a taxpayer database of all taxpayers registered at the Tax Administration of the FBH and paying the PIT in 2009 (Taxpayers' Database for the FBH) that includes around 500,000 taxpayers. As 2011 is the year of simulation (policy switching), data were updated to 2011 values and models were calibrated to 2011 taxes. The analysis is performed at the level of an individual taxpayer, as the individual taxpayer is a unit of taxation in both countries.

3.2. Inequality measures, progressivity measures, and decomposition of the redistributive effect

As already mentioned, we primarily use the Gini coefficient and concentration indices as measures of income inequality. The Gini coefficient of pre-tax income (GX) and the Gini coefficient of after-tax income (GN) are calculated, respectively, as:

$$GX = 1 - 2 \int_0^1 L_X(p) dp \quad (1)$$

$$GN = 1 - 2 \int_0^1 L^*(p) dp \quad (2)$$

where $L_X(p)$ is the pre-tax Lorenz curve, and $L^*(p)$ is the after-tax Lorenz curve.

In addition to the Gini Coefficient, which is a traditional measure of inequality, we also calculate the following concentration indices: a concentration index of after-tax income with respect to pre-tax income (DN), and a concentration index of taxes with respect to pre-tax income (DT) in the following way:

$$DN = 1 - 2 \int_0^1 L_{X-T}(p) dp \quad (3)$$

$$DT = 1 - 2 \int_0^1 L_T(p) dp \quad (4)$$

where $L_{X-T}(p)$ is the concentration curve of after-tax income with respect to pre-tax income, and $L_T(p)$ is the concentration curve of taxes with respect to pre-tax income.

Measuring income tax progressivity was first discussed by Musgrave and Thin (1948). They measured progressivity through the Gini coefficient of pre-tax and after-tax income. However, Kakwani (1977) criticised this measure for not being a measure of progressivity, but of the redistributive effect, which is a function of the average tax rate. Mathematically, the standard measure of the redistributive effect (RE) can be written as:

$$RE = GX - GN \quad (5)$$

Reynolds and Smolensky (1977) wrote RE in a similar fashion as in expression (5), but instead of the Gini coefficient of after-tax income, GN , they used the concentration coefficient of after-tax income, DN . Thus we obtain the Reynolds-Smolensky redistributive effect, $RERS$:

$$RERS = GX - DN \quad (6)$$

Kakwani (1977) then introduced a new measure of progressivity that is equal to:

$$P = DT - GX \quad (7)$$

where DT is the concentration coefficient of taxes. Later, Kakwani (1984, 1986) presented the decomposition of the redistributive effect³ by covering horizontal and vertical equity:

$$R = H + V \quad (8)$$

where H is horizontal equity and V is vertical equity. Its further decomposition is:

$$H = \frac{DN - GN}{GX} \quad (9)$$

and

$$V = \frac{tP}{(1-t)GX} \quad (10)$$

with t being an average tax rate calculated as Q / m , where Q is total tax revenue, and m is total pre-tax income.

Moreover, Atkinson (1980) and Plotnick (1981) measured the income unit re-ranking, so as to obtain the re-ranking Atkinson-Plotnick measure, RAP :

$$RAP = - (H) \quad (11)$$

which is:

$$RAP = GN - DN \quad (12)$$

Finally, the decomposition of the redistributive effect is based on the Kakwani vertical or progressivity effect (VK) and the Atkinson-Plotnick index of horizontal inequity or re-ranking effect (RAP):

$$RE = VK - RAP \quad (13)$$

meaning that the re-ranking decreases the redistributive effect. VK is calculated as:

$$\frac{tP}{(1-t)} = GX - DN \quad (14)$$

As the Atkinson-Plotnick-Kakwani decomposition misses the horizontal inequity per se in its structure, Aronson, Johnson, and Lambert (1994) captured all three: vertical effect, horizontal effect, and re-ranking, with the following decomposition (AJL stands for Aronson-Johnson-Lambert):

$$RE = VAJL - HAJL - RAJL \quad (15)$$

where $VAJL$ is derived from the Kakwani vertical or progressivity effect, $HAJL$ is based on the after-tax inequality, and $RAJL$ is the same as RAP .

This kind of methodology requires equal pre-tax income of individuals. Usually, it is not feasible in the real world to have completely equal income among the taxpayers. Therefore, close equals should be grouped, which gives rise to re-ranking. Within-group re-ranking and entire-group re-ranking are not covered here, as such methodology fails regarding the decomposition of the redistributive effects (Čok, Urban, & Verbič, 2013; Urban & Lambert, 2008).

Urban and Lambert (2008) proposed capturing all three effects (vertical, horizontal, and re-ranking), taking into account all forms of re-ranking (within group RWG , entire group REG , and Aronson-Johnson-Lambert AJL):

$$RE = V - H - RAP \quad (16)$$

Table 4. Pre-tax income, taxes, and after-tax income (in units of the AGAW).

Category	SLO	FBH	FBH – SLO	SLO – FBH
Pre-tax income	997,538	432,228	997,538	432,228
SSCER	125,703	39,268	78,752	59,467
SSCEE	163,338	114,413	241,495	76,982
TOTSSC	289,041	153,681	320,247	136,449
PIT	108,141	14,408	38,311	45,271
TOTTAX	397,182	168,089	358,558	181,720
After-tax income	600,356	264,139	638,980	250,508

Notes: SLO = Slovenian data and Slovenian parameters; FBH = FBH data and FBH parameters; FBH – SLO = FBH parameters and Slovenian data; SLO – FBH = Slovenian parameters and FBH data; Pre-tax income = Gross income subject to tax + SSCER; SSCER = Employer SSC; SSCEE = Employee SSC; TOTSSC = SSCER + SSCEE; PIT = Personal income tax; TOTTAX = SSCER + SSCEE + PIT; After-tax income = Pre-tax income – SSCER – SSCEE – PIT.

Source: Taxpayers' Database for the FBH and Administrative Database for Slovenia; authors' calculations.

where:

$$RAP = RWG + REG + RAJL \quad (17)$$

From equations (16) and (17) we then obtain the following expression for $VAJL$:

$$VAJL = V - REG \quad (18)$$

and the following expression for $H AJL$:

$$H AJL = H + RWG \quad (19)$$

which means that:

$$V = VAJL + REG \quad (20)$$

and

$$H = H AJL - RWG \quad (21)$$

Since $V - H = RE + RAP$, it follows from equation (13) that:

$$VK = V - H \quad (22)$$

Our article is based on the Atkinson-Plotnick-Kakwani decomposition (even though we also presented other decompositions of the redistributive effect). We do so to enable comparison with the results for other countries. Namely, even though being the most comprehensive, the Urban-Lambert decomposition was introduced only recently.

4. Key findings

In Table 4, we compare the aggregated amounts of pre-tax income subject to tax, taxes, and after-tax income in both countries. In addition, Table 5 reveals the average after-tax income by decile groups, while Table 6 highlights the inequality measures, progressivity measures, and the redistributive effect of taxes. In all cases, we also present the findings of policy switching between Slovenia and the FBH.

Table 4 shows the pre-tax income, employer (SSCER) and employee (SSCEE) social security contributions, and PIT and after-tax income for both countries. All data are expressed in units of the AGAW. The last two columns of the table include policy shifting results, showing what would happen if Slovenia (FBH) applied the FBH (Slovenian) parameters. Applying

Table 5. Average after-tax income by decile groups (in units of the AGAW).

Decile Groups	SLO	FBH	FBH – SLO	SLO – FBH
I	0.0141	0.0357	0.0143	0.0339
II	0.1042	0.1343	0.1053	0.1356
III	0.2724	0.2437	0.2685	0.2539
IV	0.3889	0.3171	0.3680	0.3363
V	0.4562	0.3635	0.4452	0.3884
VI	0.5247	0.4355	0.5254	0.4543
VII	0.6110	0.5619	0.6170	0.5494
VIII	0.7239	0.6948	0.7417	0.6568
IX	0.8959	0.8799	0.9415	0.8238
X	1.5011	1.7220	1.7740	1.4708
Total	0.5492	0.5388	0.5801	0.5104

Notes: SLO = Slovenian data and Slovenian parameters; FBH = FBH data and FBH parameters; FBH – SLO = FBH parameters and Slovenian data; SLO – FBH = Slovenian parameters and FBH data.

Source: Taxpayers' Database for the FBH and Administrative Database for Slovenia; authors' calculations.

Table 6. Inequality measures, progressivity measures, and the redistributive effect.

	SLO		FBH		FBH – SLO		SLO – FBH	
		% RE		% RE		% RE		% RE
Scenario 1								
<i>GX</i>	0.4652		0.4579		0.4652		0.4579	
<i>GN</i>	0.4102		0.4478		0.4442		0.4121	
<i>RE</i>	0.0550		0.0101		0.0210		0.0458	
<i>RE / GX</i>	0.1183		0.0221		0.0451		0.0100	
<i>DN</i>	0.4075		0.4460		0.4409		0.4097	
<i>DT</i>	0.5524		0.4768		0.5086		0.5245	
<i>P</i>	0.0872		0.0188		0.0434		0.0666	
<i>t</i>	0.3982		0.3881		0.3594		0.4204	
<i>VK</i>	0.0577	104.92	0.0199	117.98	0.0243	116.12	0.0483	105.42
<i>RAP</i>	0.0027	4.92	0.0018	17.98	0.0034	16.12	0.0025	5.42
Scenario 2								
<i>GX</i>	0.4539		0.4574		0.4531		0.4569	
<i>GN</i>	0.4102		0.4478		0.4442		0.4121	
<i>RE</i>	0.0437		0.0096		0.0089		0.0447	
<i>RE / GX</i>	0.0962		0.0210		0.0197		0.0979	
<i>DN</i>	0.4095		0.4476		0.4441		0.4096	
<i>DT</i>	0.7001		0.6373		0.6040		0.7186	
<i>P</i>	0.2462		0.1799		0.1509		0.2617	
<i>t</i>	0.1526		0.0517		0.0566		0.1530	
<i>VK</i>	0.0443	101.57	0.0098	102.10	0.0090	101.50	0.0473	105.76
<i>RAP</i>	0.0007	1.57	0.0002	2.10	0.0001	1.50	0.0026	5.76

Notes: SLO = Slovenian data and Slovenian parameters; FBH = FBH data and FBH parameters; FBH – SLO = FBH parameters and Slovenian data; SLO – FBH = Slovenian parameters and FBH data; *GX* = Gini coefficient of pre-tax income; *GN* = Gini coefficient of after-tax income; *RE* (redistributive effect) = $GX - GN$; *RE / GX* = share of RE in *GX*; *DN* = Concentration coefficient of after-tax income; *DT* = Concentration coefficient of taxes; *P* = Kakwani index of progressivity; *t* = average tax rate; *VK* = vertical effect; *RAP* = re-ranking effect; *VK* (% RE) = *V* as percentage share in *RE*; *RAP* (% RE) = *RAP* as percentage share in *RE*.

Scenario 1: Pre-tax income = Gross income subject to tax + SSCER (employer SSC); Taxes = SSCER (employer SSC) + SSCEE (employee SSC) + PIT; After tax income = Pre-tax income – SSCER – SSCEE – PIT.

Scenario 2: Pre-tax income = Gross income subject to tax – SSCEE (employee SSC); Taxes = PIT; After tax income = Pre-tax income – PIT.

Source: Taxpayers' Database for the FBH and Administrative Database for Slovenia; authors' calculations.

the FBH parameters, Slovenia would experience a decrease in SSCER and PIT, while SSCEE would increase. The FBH flat rate of 10% would decrease Slovenian PIT revenues by 64.65% (from 108,141 units of the AGAW to 38,311 units of the AGAW). Consequently, the total taxes would decrease by 9.72%, contributing to a growth of after-tax income by 6.43%. Applying the Slovenian parameters to FBH data, the overall collection of SSC would decrease by 11.21%, while progressive rates of Slovenian PIT would increase the FBH PIT revenue by 3.14 times. Total taxes would increase by 8.11%, reducing the after-tax income by 5.16%.

Table 5 shows the distribution of the average after-tax income by decile groups for both countries. All data are expressed in units of the AGAW. The last two columns of the table again include policy shifting results. All Slovenian decile groups, except the third, fourth, and fifth, would experience an increase in after-tax income, if the FBH tax system would be applied. The reason is a combination of FBH allowances and its flat 10% PIT rate, which substantially reduces the effective tax rates for most Slovenian taxpayers from the sample. Consequently, the major increase of 18.18% in the after-tax income would be experienced by those in the tenth decile group. On the other hand, if Slovenian tax parameters were applied to the FBH data, five decile groups (the first and top four) would experience a decrease in the after-tax income. However, the largest decrease in the after-tax income (of 14.59%) would be experienced by those in the tenth decile group.

Table 6 represents inequality measures, progressivity measures, and the redistributive effect of taxes in both countries. The last two columns of the table again include policy shifting results. In Scenario 1, we take into account the overall effect of both PIT and SSC, while in Scenario 2 we only take into account the effect of PIT.

The results show that the inequality of pre-tax income in Scenario 1, measured through the Gini coefficient, is 1.59% higher in Slovenia (0.4652) than in the FBH (0.4579). Slovenia also experiences a higher redistributive effect of taxes than the FBH, which is revealed through the reduction of the Gini coefficient (after taxes) by 11.82%, whereas in the FBH the Gini coefficient is reduced by 2.21%. The concentration coefficient of after-tax income is 9.45% higher in the FBH (0.4460) than in Slovenia (0.4075). The concentration coefficient of taxes is 15.86% higher in Slovenia (0.5524) than in the FBH (0.4768). The Kakwani index of progressivity is substantially higher in Slovenia (0.0872) than in the FBH (0.0188), indicating extremely high tax progressivity in Slovenia.

Similar results are revealed in Scenario 2, which takes into account PIT only. Since the Slovenian PIT includes a progressive tax schedule, while the FBH uses a flat PIT regime, it is not a surprise that the Slovenian PIT system exhibits a higher redistributive effect overall. However, redistributive losses, which are a consequence of different treatment of taxpayers through the PIT acts, are relatively low in both Slovenia and the FBH (1.57% of the RE and 2.10% of the RE, respectively). On the other hand, Scenario 1 exhibits much higher redistributive losses, especially in the FBH (17.98% of the RE), as Scenario 1 also includes social security contributions next to the PIT, and social security contributions are paid only by some taxpayers⁴ (Stanovnik & Verbič, 2005, 2013).

In the case of policy switching in Scenario 1, when Slovenia applies the FBH parameters, the Gini coefficient of after-tax income increases by 8.29%, implying higher income inequality. In the FBH, the Gini coefficient of after-tax income initially amounts to 0.4478. If the FBH applies Slovenian parameters, the Gini coefficient of after-tax income becomes equal to 0.4121, resulting in a 7.97% decrease. In other words, applying the Slovenian parameters results in the FBH experiencing less inequality of after-tax income.

The concentration coefficient of after-tax income decreases by 8.14% (from 0.4460 to 0.4097) and the concentration coefficient of taxes increases by 10.00% (from 0.4768 to 0.5245), if the Slovenian parameters are applied to the FBH data. Looking at the decomposition of the redistributive effect, we observe that applying the FBH parameters to Slovenian data results in the redistributive effect decreasing by 61.82% (from 0.055 to 0.021), and increasing by 4.53 times (from 0.0101 to 0.0458) when the FBH data and Slovenian parameters are used.

The Kakwani index of progressivity decreases by 50.23% (from 0.0872 to 0.0434) in Scenario 1, when the FBH parameters are applied to Slovenian data, and increases by 3.54 times (from 0.0188 to 0.0666), when the FBH data and Slovenian parameters are used. The increase in income inequality in Slovenia (decrease in the FBH) when switching to the FBH (Slovenian) system is caused by a decrease (increase) in the average tax rates, since Slovenia experiences much higher tax progressivity. The loss of redistribution increases from 4.92% of the RE to 16.12% of the RE in Slovenia when applying the FBH parameters (and decreases from 17.98% of the RE to 5.42% of the RE when the FBH data and Slovenian parameters are used), implying higher losses of redistribution in the FBH tax system.

The results of policy switching in Scenario 2 are in line with the results of Scenario 1, revealing that an application of the FBH parameters of a flat PIT system to Slovenian data slightly reduces the loss of redistribution (from 1.57% of the RE to 1.50% of the RE), compared with the current Slovenian PIT system. And vice versa, the application of the progressive Slovenian PIT system to the FBH data reveals an increase in the loss of redistribution.

5. Conclusion

This article examined the impact of policy switching between Slovenia and the FBH on revenue collection, after-tax income, inequality measures, progressivity measures, and the redistributive effect. The key findings showed that by applying the FBH parameters, Slovenia would lose 9.72% of total taxes (PIT and SSC), whereas the after-tax income would increase by 6.43%. The FBH would experience a converse process; the total taxes would increase by 8.11%, reducing the after-tax income by 5.16%.

Investigation of the impact of policy switching on the average after-tax income by decile groups revealed that in Slovenia the taxpayers would be better off in seven decile groups, whereas in the FBH the taxpayers would be better off in the bottom five decile groups, while the others would experience a reduction of after-tax income. However, the major difference in after-tax income would be experienced by those in the tenth decile group in both countries. Inequality of after-tax income would increase in Slovenia, whereas it would decrease in the FBH. Put into figures, the Gini coefficient of after-tax income would increase by 8.29% in Slovenia, whereas in the FBH it would decrease by 7.97%. In terms of the loss of redistribution, the FBH would exhibit a higher loss than Slovenia.

The research has its limitations. The major limitation is the exclusion of certain tax allowances and sources of income that are not taxed in both systems. This particularly refers to pensions, which represent a major income source for an important part of the population in both countries. Last but not least, differences between countries are sufficient to expect that people in each country would react (change their behaviour) if the tax system of the other country is applied. Nevertheless, our results highlight the consequences of a rather

divergent development of two tax systems, and show how countries with once common background can become different in a relatively short period of time.

Notes

1. Bosnia and Herzegovina consists of two entities (the Federation of Bosnia and Herzegovina and the Republic of Srpska) and the Brčko District. Each entity and the district have their own PIT acts and its own tax administration for direct taxes. However, we use the term 'country' for the Federation of Bosnia and Herzegovina (FBH) throughout this article for practical purposes.
2. We express values in terms of average gross wage to enable comparison. We consider this approach more suitable than expressing values in absolute terms in national currencies (EUR and Bosnian Convertible Marks) due to huge differences in income. Namely, the average gross annual wage in 2011 was €18,295.67 in Slovenia (Statistical Office of the Republic of Slovenia, 2015) and €7,659.38 in the FBH (Institute for Statistics of the FBH, 2012).
3. The redistributive effect was stated earlier through the Gini coefficient; see equation (5).
4. In particular, by those who earn income from employment, self-employment, and contractual work in both Slovenia and the FBH, and by those who earn income from royalties in the FBH.

Disclosure statement

No potential conflict of interest was reported by the authors.

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