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Abstract

The aim of this paper is to investigate the fairness and the redistributive effects of personal income tax (PIT) in seven Central and Eastern European countries, namely: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania and Romania. Following Kakwani and Lambert (1998) methodology, we test tax equity and progressivity. We study the asymmetry of salary income distribution in order to examine the horizontal equity among individuals in the same group. We calculate the Gini coefficients in order to investigate the redistributive effects of PIT regulatory frameworks. We find that tax equity is fulfilled by all countries. However, PIT regulations does not allow for strong progressivity and for redistributive effects.

Keywords: horizontal equity; vertical equity; personal income tax; income distribution; inequality; Gini; Central and Eastern European

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1.Introduction

It has been to a great concern to the governments to find means and methods to raise taxes from the citizens in a fair and efficient way. In this sense, the economic theory asserts the *benefit principle*, which in a very simplified way it argues that those who benefit more from the government expenditures should pay more taxes to support such expenditures. From this perspective, fees and charges are the most appropriate forms of government finance (Hyman, 2011). The great advantage of this approach is that it links the cost per unit of the government provided services with their marginal benefits, which results in a Lindahl equilibrium and avoids the free-rider problem. However, considering that, most of the government provided goods and services are non-excludable and/or non-rival, the assignment to individuals is problematic, and it makes the benefit approach difficult to implement.

In 1776, Adam Smith replaced the benefit rule with the *principle of equity*, which holds that "the subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the state". Since its verbalization, this maxim has endangered significant controversy among scholars and politicians. Its importance is conferred by the fact that it has become an underlying rule of modern taxation systems. Governments nowadays uses the equity approach to assess the value of the taxes levied on individuals and as a mechanism to ensure the fairness and impartiality of tax distribution among citizens.

Discussions on tax equity are expressed in terms of *horizontal* and/or *vertical* equity. Horizontal equity (HE) is conventionally defined as requiring equal fiscal treatment for equals, while the vertical equity (VE) is commonly viewed as an appropriate differentiation in the tax burden among unequal taxpayers. The main critiques which have been brought draw attention to the lack of a normative content of both concepts and to the difficulties in measuring and applying VE and HE. Although significant efforts have been made to address unresolved issues surrounding these two notions (King, 1983; Kaplow, 1989; Slesnick, 1989; Musgrave, 1990; Duclos and Lambert, 2000; Auerbach and Hassett, 2002; Galbiati and Vertova, 2008), the properties and the normative content of this principle have not been entirely clarified.

The economic theory on social preferences has suggested that people feature a self-centered inequity aversion in the sense that they do not care about inequity itself, but they are interested in their own payoffs related to others' payoffs (Fehr and Schmidt, 1999). More recently, Alm, Kirchler and Muehlbacher (2012) have pointed toward a citizens' pronounced sense of justice when complying with taxes. They identified three forms of justice that strongly influence the tax compliance: distributive justice which relates to the horizontal and vertical equity and exchange fairness; procedural justice connected with the fairness of procedures for making tax decisions; and redistributive justice which refers to the fairness of the form and severity of the punishment imposed. In general, tax legislation creates inequity among people (Plotnick, 1981) and considering that it was mentioned before, an unfair tax system can cause unsatisfaction among taxpayers, which, eventually, can lead to tax avoidance or tax evasion and affects not only Government's ability to raise revenues, but also economic stabilization and income redistribution (Dean, Keenan and Kenney, 1980).

The general wisdom favors the progressivity in taxation as opposed to proportionality or regressivity as the most appropriate mean in fulfilling tax equity (Ifanti, 2008). Our view diverges to some extent

from this perspective in the sense that we believe that the economists have to make a clear distinction between tax equity and the redistributive effects of taxes. Besides being the principal mean of collecting government revenues, taxation is also a powerful tool that affects the distribution of incomes in one economy. Economists who studied tax equity took into consideration the joint hypothesis of progressivity and redistribution as evidences of fairness of taxation systems. However, we believe that income redistribution is a political option and the selection of the tax schemes (proportional, progressive or regressive), which lead to more or less inequalities, depends on governments' agendas. Therefore, tax equity and the redistributive effects of a tax schedule should be studied independently and not as parts of the same principle. Tax equity can be achieved even if the redistributive effects are poor.

The aim of this paper is to shed more light on tax equity issues by studying the fairness and the redistributive effects of the PIT in Central and Eastern European countries (CEECs), namely Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania and Romania that use the flat tax rate. It is well known that its implementation can be often progressive depending on tax deductions, exemptions and allowances or tax reliefs that diminish the tax liability and increase the effective tax rate. Therefore, we use a threefold approach to conduct our analysis. Firstly, we examine if the PIT regulations fulfill the tax equity conditions. Secondly, we investigate whether the PIT regulatory frameworks promote or inhibit progressivity. Thirdly, we analyze the redistributive effects of PIT schedules using the Gini coefficients of the pre-and post-tax income. For these purposes, we use the existing PIT regulations as of 2016. The reminder of this paper is organized as follows: Section 2 summarizes the PIT frameworks in CEECs. Section 3 describes the methodology used. Section 4 reports the results and discusses the results. Section 5 emphasize the policy implications of our study and formulates the necessary recommendations.

2. Personal Income Tax Regulations in CEECs[1]

According to Tax Regulations in force in 2016, the seven countries under investigation have used the PIT flat tax rate. The lowest rate of 10% is applied in Bulgaria, while the highest rate of 23% is employed in Latvia. In this section, we present the main characteristics of the PIT regulations in what regards the tax allowances (social contributions, personal deductions), tax credits for dependents, tax rates etc. We focus only on the income earned from salary which is defined as the total amount of salaries, wages, benefits in kind and other income received by an individual from an employer, under an employment contract.

2.1. Bulgaria

Bulgarian residents pay taxes on the salary received. Tax allowances are related to social contributions and personal deductions. Employee's total share of social contributions (consisting of contribution to pension fund, health insurance, unemployment fund and other additional mandatory social contributions) is of 12.9% of gross income. The monthly taxable base for social security contribution is capped at BGN 2,600 (equivalent of BGN 31,200/year). As regards the personal deductions allowed for tax purposes, employees may deduct from their annual taxable base the following amounts: (i) there is no deduction allowed for employees without dependent children; (ii) BGN 200 per each child, up to three minor children. Besides personal deductions, Bulgarian residents are also entitled to deduct

[1] Information regarding the PIT regulatory frameworks in CEECs is extracted from EY (2016).

amounts for: mortgage interest, voluntary pension contributions or voluntary health and life insurance contributions made by individuals to authorized funds. The flat rate used for salary income taxation in Bulgaria is 10%.

2.2. The Czech Republic

The Czech residents are subject to PIT for their salary income. Social contributions due by employees are the only deductions allowed for personal income tax purposes. Employee's total share of social contributions (consisting of contribution to old-age pension and health insurance) is of 11% of gross income. The monthly taxable base for social security contribution is capped at 4 times the monthly average salary (equivalent of CZK 1,296,288/year). Czech Republic is the only analysed CEEC where deductions for dependent persons are not granted because a tax relief is allowed. Thus, employees may decrease their annual tax liability with the following amounts, as tax credits: (i) CZK 24,840 as personal tax relief (employees without dependent children); (ii) CZK 13,404 for the first dependent child; (iii) CZK 17,004 for the second dependent child; (iv) CZK 20,604 for the third and each additional child. Other tax reliefs are also available for a spouse living in the same household with the taxpayer, for dependent disabled persons etc. But, total annual tax credit allowed for dependents may not exceed CZK 60,300. The flat tax rate for salary income in Czech Republic is 15%, but a solidarity surcharge of 7% applies to annual employment income exceeding 48 times the monthly average salary (equivalent of CZK 1,296,288 in 2016).

2.3. Estonia

Residents of Estonia are subject to PIT for their salary income. Employee's total share of social contributions (consisting of mandatory pension fund and unemployment insurance) is of 3.6% of gross income. No ceiling applies to the amount of salary subject to social contributions and the amounts paid are recognized as tax allowances when computing PIT for salary income. The personal deductions are allowed for tax purposes, thus employees may deduct from their annual taxable base the following amounts: (i) EUR 2,040 as basic deduction (for employees with no dependents); (ii) EUR 1,848 per each child, beginning with the second child. Besides personal deductions, Estonian residents are also entitled to deduct amounts for: acquisition of voluntary pension fund units, training expenses for educating individuals and their dependents up to 26 years old, interest paid to credit institutions on housing loans. The standard income tax rate in Estonia is a flat rate of 20%.

2.4. Hungary

Hungarian residents are subject to PIT for their salary income. Each employee is subject to 18.5% social security contribution (as pension contribution, health care insurance and labor force contribution) on salary income. No employee pension contribution cap applies. The most significant personal deduction is represented by the family tax allowance, which applies without an income limit and decrease the annual taxable base, cumulated for both spouses, with the following amounts: (i) there is no deduction allowed for employees without dependent children; (ii) HUF 66,670/month for each child, for employees having one child; (iii) HUF 83,330/month for each child, for employees having two children; (iv) HUF 220,000/month for each child, for employees having three or more children. It is to be noticed that the family tax allowance is much lower for dependents, other than minor children. Other tax allowances are insignificant. A 15% flat PIT rate applies to employment income.

2.5. Latvia

Residents are subject to Latvian PIT for their salary income. Tax allowances mainly consist of social contributions and tax deductions. Employees make social security contributions on monthly salaries at general rate of 10.5% (including contributions for pension funds, unemployment contribution and other additional mandatory social contributions). As personal deductions allowed for tax purposes, employees may deduct from their annual taxable base the following amounts: (i) EUR 75/month as basic deduction for employees without dependent children; (ii) EUR 175/month for each child. Besides personal deductions, Latvian residents are also entitled to deduct amounts for: contributions to private pension funds and to life insurance schemes, medical expenses and expenses for professional education, up to an annual threshold, etc. Income tax at a basic flat rate of 23% applies to salary income.

2.6. Lithuania

Residents employed by Lithuanian companies are subject to PIT for their salaries. Employers must withhold social security contributions at a rate of 3% from an employee's gross salary, but it is not deductible when calculating the amount of PIT to be withheld from the employee's gross payroll. The total share of employee's social contributions is of 9% (also including healthcare insurance, which is deductible for tax purposes). Each taxpayer earning salary income is entitled to receive a tax allowance by decreasing the monthly taxable base with a basic personal deduction, computed based on the amount of gross income (GI), using the following formula: $200 - 0.34 \times (GI - 350)$. Individuals who have dependent children are also allowed to an additional deduction of EUR 60/month/child, for each child and for each parent. Lithuanian residents earning salary income may also deduct amounts related to: contributions to pension funds, cumulative life insurance premiums, expenses for vocational training and studies etc. The flat tax rate applied for salary income taxation in Lithuania is 15%.

2.7. Romania

Romanian residents earning salary income are subject to PIT. Tax allowances consist of social contributions and personal deductions. The total share of employee's social contributions is of 16.5% (including social security contribution, healthcare insurance and unemployment contribution). Monthly taxable base for social security contribution is capped at 5 times the average gross salary (which is RON 13,405/month, equivalent of RON 160,860/year). Each taxpayer is entitled to a monthly personal deduction, set depending on the level of GI and number of dependents, as follows: (i) for individuals earning monthly GI less than RON 1,500: RON 300 for employees without dependent children; RON 400 for employees having one child; RON 500 for employees having two children; RON 600 for employees having three children; RON 800 for employees having four or more children; (ii) for individuals earning monthly GI between RON 1,500 and RON 3,000: $300 \times [1 - (GI - 1,500)/1,500]$ for employees without dependent children; $400 \times [1 - (GI - 1,500)/1,500]$ for employees having one child; $500 \times [1 - (GI - 1,500)/1,500]$ for employees having two children; $600 \times [1 - (GI - 1,500)/1,500]$ for employees having three children; (v) $800 \times [1 - (GI - 1,500)/1,500]$ for employees having four or more children; (ii) for individuals earning monthly GI between higher than RON 3,000 no personal deduction is allowed. Additional deductions are also granted for:

contributions to private pension funds, private health insurance, trade union contributions. Salary income is subject to tax at a flat rate of 16%.

3. Methodology

For the purpose of our paper, we use a generated dataset[2] for each country under investigation. There are several sound reasons for which we decided to use a generated dataset: (i) we can use a dataset which is not affected by tax avoidance or to any other assimilated practices. There is a number of studies that showed, for instance, the prevalence of envelope wages in former communist countries which represents an illegitimate wage arrangement used by formal employers aimed to help them to avoid paying full social contributions and tax liabilities (Sedleniesk, 2003; Williams, 2009; Meriküll and Staehr, 2010). (ii) we have the possibility to generate salary income which are symmetrically distributed around the mean salary of each group. (iii) we can study and emphasize more clearly the effects of PIT regulations on salary income without being restricted by a certain settlement of the existing salaries.

We assume that our total population of taxpayers comprises 600 distinct individuals ($i = \overline{1,600}$) who earn salary income. We divided the 600 taxpayers into 6 distinct sub-groups of 100 individuals depending on their annual salary. The first group (**G1**) includes individuals earning salary income starting from the minimum annual salary up to the average annual salary. The following formula gives the pace of the increase in the salary among the individuals of the 1st group: $(average\ annual\ salary - minimum\ annual\ salary)/100$. The second group (**G2**) includes taxpayers who earn income that vary between the average annual salary and twice the average annual salary. The third group (**G3**) consists of individuals having income ranging from twice the average annual salary and three times the average annual salary. The fourth group (**G4**) comprises taxpayers who earn income varying from three times the average annual salary and fourth times the average annual salary. The fifth group (**G5**) includes individuals whose income vary from fourth to fifth times the average annual salary, and the sixth group (**G6**) comprises taxpayers who earn income that range from fifth to sixth times the average annual salary. The pace of the increase of salary income among the individuals of groups 2, 3, 4, 5 and 6 is given by the following formula: $average\ annual\ salary/100$. The annual salary (minimum / average) is calculated as: $12\ months \times minimum/average\ monthy\ salary$. Table 1 in the Appendix summarizes the information that has be taken into consideration for tax calculation purposes.

For an identical approach, we have chosen to take into consideration only the tax allowance (or tax credit for the particular case of Czech Republic) related to personal deductions for dependent children (other deductions are not available for residents of all analyzed CEECs). For this reason, we assume that each individual of the population of 600 can be in one of the following circumstances: **S0** - employee without dependent children; **S1** - employee having one dependent child; **S2** – employee with two dependent children; **S3** – employee with three dependent children; **S4** – employee with four or more dependent children.

So, we examine how persons belonging to the same income group (earning similar salaries) and having similar social conditions (number of dependent children) are treated from taxation perspective.

[2] The dataset is available upon request.

For the purposes of our study, we describe the methodology in two distinct sub-sections: (i) one devoted to the analysis of tax equity and progressivity of the PIT regulatory frameworks in CEECs; (ii) one assigned to the examination of the redistributive effects of the PIT schedules in CEECs.

3.1. Tax equity and progressivity

For this purpose, we develop upon the framework introduced by Kakwani and Lambert (1998) who defined the equity in income taxation by means of three axioms. We assume X_i pre-tax salary income of individual i, and T_i the tax liability. The axioms are described below:

$$A_1: X_i \geq X_j, T_i \geq T_j \tag{1}$$

$$A_2: X_i \geq X_j, T_i \geq T_j \Rightarrow \frac{T_i}{X_i} \geq \frac{T_j}{X_j} \tag{2}$$

$$A_3: X_i \geq X_j, T_i \geq T_j, \frac{T_i}{X_i} \geq \frac{T_j}{X_j} \Rightarrow X_i - T_i \geq X_j - T_j \tag{3}$$

The first axiom (A_1), which corresponds to a minimal progression, says that tax should increase monotonically according to people's ability to pay. The second axiom (A_2) tests the progressivity principle in the sense that richer people must pay higher taxes. In the case that these two axioms are fulfilled, the third axiom (A_3) checks if taxation does not cause a re-ranking in people's living standards and it can be seen as a vertical restriction ruling out too much progressivity.

In order to test the three axioms, we calculate the median of the pre-tax salary income[3] ($\widetilde{X_{G_k}}$), of the tax due ($\widetilde{T_{G_k}}$) and of the after-tax salary income[4] ($\widetilde{X_{G_k} - T_{G_k}}$) for each group $\mathbf{G_k}$, where $k = \overline{1,6}$ and for each of the corresponding situation described by **S0** to **S4**. We use the median in order to avoid the potential asymmetries generated by the PIT regulations in the distribution of the pre- or after-tax salary income or of the taxes paid. We make comparisons between the groups of individuals. We say that axioms 1 to 3 are fulfilled if the following conditions are met:

$$C_1: \widetilde{X_{G_m}} > \widetilde{X_{G_n}} \Rightarrow \widetilde{T_{G_m}} > \widetilde{T_{G_n}} \tag{4}$$

$$C_2: \widetilde{X_{G_m}} > \widetilde{X_{G_n}}, \widetilde{T_{G_m}} > \widetilde{T_{G_n}} \Rightarrow \frac{\widetilde{T_{G_m}}}{\widetilde{X_{G_m}}} > \frac{\widetilde{T_{G_n}}}{\widetilde{T_{G_n}}} \tag{5}$$

$$C_3: \widetilde{X_{G_m}} > \widetilde{X_{G_n}}, \widetilde{T_{G_m}} > \widetilde{T_{G_n}}, \frac{\widetilde{T_{G_m}}}{\widetilde{X_{G_m}}} > \frac{\widetilde{T_{G_n}}}{\widetilde{T_{G_n}}} \Rightarrow \left(\widetilde{X_{G_m} - T_{G_m}}\right) > \left(\widetilde{X_{G_n} - T_{G_n}}\right) \tag{6}$$

Compared to the original three axioms of Kakwani and Lambert who allowed for HE, our three conditions do not permit it because we assumed that the 600 individuals earn totally different salary incomes and, therefore, the medians of the pre-tax, after-tax salary income and of the tax paid will be different for each group and increasing. By testing the three conditions, we examine only the VE principle, and we investigate tax equity between groups of people.

[3]We calculate the pre-tax salary income as difference between the gross salary and social contributions.

[4] We calculate the after-tax salary income as difference between the pre-tax salary income and tax due.

In order to study the inequities among the individuals comprising the same group, we check if the distribution of taxes paid and of post-tax salary income is symmetric. Because the pre-tax salary income is symmetrically distributed as we purposely generated it, applying the PIT regulatory frameworks should lead to a symmetric distribution of the post-tax salary income. Thus, we calculate the skewness of taxes distribution ($\gamma_{T_{G_k}}$) and of the after-tax salary income distribution ($\gamma_{(X-T)_{G_k}}$) within each group of individuals, using the equations described below:

$$\gamma_{T_{G_k}} = E\left[\left(\frac{T_{i_{G_k}} - \mu_{T_{G_k}}}{\sigma_{T_{G_k}}}\right)\right]_{G_k} \quad (7)$$

$$\gamma_{(X-T)_{G_k}} = E\left[\left(\frac{(X-T)_{i_{G_k}} - \mu_{(X-T)_{G_k}}}{\sigma_{(X-T)_{G_k}}}\right)\right]_{G_k} \quad (8)$$

where, $T/(X-T)_{i_{G_k}}$ represents the tax paid/after-tax salary income received by individual *i* belonging to group G_k; $\mu_{t/(X-T)_{G_k}}$ is the mean of the taxes paid/after-tax salaries income received by individuals in group G_k; $\sigma_{T/(X-T)_{G_k}}$ is the standard deviation of the taxes paid/after-tax salary income received by individuals in group G_k; $k = \overline{1,6}$; *E* is the expectation operator.

If the PIT regulations does not generate any inequity among the individuals comprising the same group of income, the condition 4 (C_4) has to be fulfilled:

$$C_4: \gamma_{X_{G_k}} = 0, \gamma_{T_{G_k}} = 0 \Rightarrow \gamma_{(X-T)_{G_k}} = 0 \quad (9)$$

where, $\gamma_{X_{G_k}}$ is the skewness of the pre-tax salary income distribution.

3.2.Redistributive effects

For the study of the redistributive effects of the PIT regulatory frameworks, we calculate the Gini coefficient of the pre- tax ($Gini'_{G_k}$) and after-tax ($Gini''_{G_k}$) salary income for each group of individuals of the corresponding situations described in section 3.1. It is generally accepted that the Gini coefficient represents the most commonly used measure of income inequality. Gini coefficient takes values between 0 and 1. A Gini coefficient of zero expresses perfect equality of income distribution, whilst a Gini coefficient of 1 shows maximal inequality of income distribution. As for the income to be equal distributed among people, Gini coefficients should be closer to zero. If the PIT regulations contribute to an equal distribution of income, Gini coefficient of the after-tax salary income is smaller than the Gini coefficient of the pre-tax salary income. In the case that both Gini coefficients are equal then the PIT regulatory framework does not contribute to the redistribution of income. If Gini coefficient of the pre-tax income is smaller than Gini coefficient of the after-tax income then the PIT leads to unequal redistribution of income. Therefore, we test the following hypothesis:

H_1: PIT regulatory framework has redistributive effects on the equal distribution of salary income

against the null hypothesis:

H_0: PIT regulatory framework has no redistributive effects on the distribution of the salary income

If $Gini''_{G_k} < Gini'_{G_k}$, then we accept H_1 and reject the null hypothesis. If $Gini'_{G_k} = Gini''_{G_k}$, then we accept the null hypothesis and reject the alternative one.

In order to analyze the magnitude of the redistributive effects, we calculate the percentage change of the Gini coefficient as described by the equation below:

$$\Delta\%Gini = \frac{Gini''_{G_k} - Gini'_{G_k}}{Gini'_{G_k}} \cdot 100 \quad (10)$$

4.Results and discussions

4.1.Tax equity and progressivity

In order to examine if PIT regulatory frameworks satisfy the principle of tax equity and if they promote progressivity, we test conditions C_1, C_2, and C_3 using the dataset generated according to the description in section 3. If these conditions are confirmed, then the axioms A_1, A_2, and A_3 are also validated. For these purposes, we calculated the descriptive statistics of the pre- and after-tax salary income and of taxes paid by the individuals. Tables 2a to 2e in the Appendix report the results in this sense for each group of persons and for the corresponding situation of the number of dependent children.

Condition C_1 is tested by making comparison of the pre-tax salary income and of the amount of taxes paid as an effect of the PIT regulations. The results show that the value of tax increases with the increase in the value of the pre-tax salary income. Thus, condition C_1 is met and we can state that axiom A_1 is fulfilled. This implies that PIT regulations in CEECs satisfy the principle of equity irrespective of the number of dependent children.

In order to verify condition C_2, and, hence the fulfillment of axiom A_2, we calculate the effective tax rates for each group of individuals. The effective tax rates are calculated as ratio between the median of tax paid on salary income over the median of the pre-tax salary income. Table 3 in the Appendix reports the results. We can observe mixed results. For employees without dependent children, the results indicate no progressivity for Bulgaria's and Hungary's cases because no tax deductions are granted for employees having no dependent children (social contributions calculated as share of gross salary income are the only tax allowances. For Lithuania and Romania, the PIT regulatory frameworks generates some progressivity for the individuals included in groups **G1** and **G2**. For the people earning income higher than twice the average annual salary, although the pre-tax income increases and the tax increases as well (as it was shown by condition C_1), the effective tax rates remains flat. This is the consequence of granting tax deductions only for employees earning salary income up to a threshold, which is found for both countries in **G2** group of incomes. Starting with G3 group of income, because no tax deductions are allowed, the situation is similar with Bulgaria and Hungary. For Czech Republic, Estonia and Latvia, we observe progressivity. This is due to the fact that personal tax deductions (or tax credits for the particular case of Czech Republic) are allowed for the employee him/herself, even if there are no dependent children, for all employees in **G1** – **G6** groups. When employees have dependent children, we observe more progressivity as an effect of the PIT regulations applicable in the CEECs, with only one exception: Romania's case. For this country, we observe again progressivity only for the groups **G1** and **G2** for the same reason: only employees in group **G1** and part of the

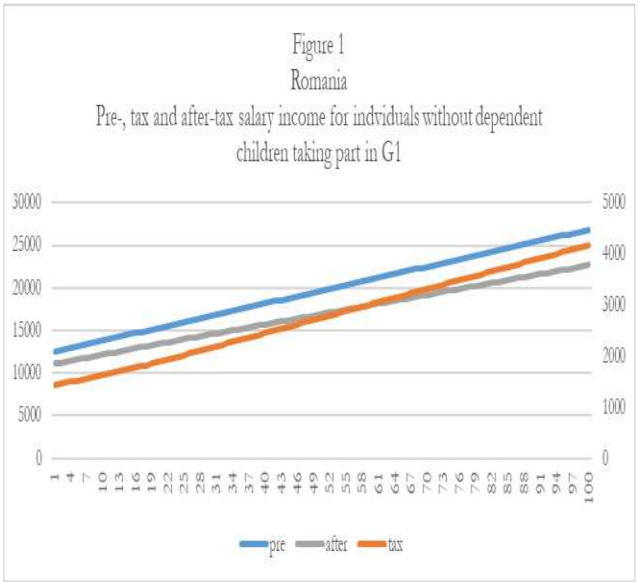
employees in group **G2** may benefit of tax deductions for dependent children. For Bulgaria, the low amount used for tax purposes as tax deduction for dependent children generates smooth progressivity. For other five countries (Czech Republic, Estonia, Hungary, Latvia and Lithuania), significant progressivity may be observed, due to the significant amounts allowed as tax deductions (or tax credits for Czech Republic). It is clearly demonstrated that the progressivity increases if the number of dependent children is higher and the amount used as tax deduction / tax credit is higher. Therefore, we can state that axiom A_2 regarding progressivity of taxation is not fulfilled by the PIT regulatory frameworks in all CEECs and for all groups of individuals.

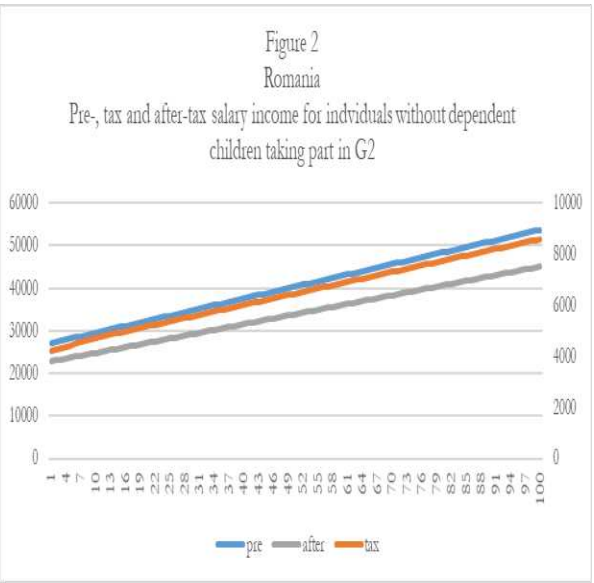
Condition C_3 is verified by comparing the medians of the pre-tax and after-tax salary income as they are reported in Tables 2a to 2e. We observe that the after-tax salary income increases with the increase of the pre-tax salary income and of taxes. Even if the progressivity principle stated by axiom A_2 is not entirely satisfied, the PIT regulations in CEECs do not cause any re-ranking in people's living standards.

Examining the skewness of the pre-tax salary income ($\gamma_{X_{G_k}}$), of taxes ($\gamma_{T_{G_k}}$) and of the after-tax salary income ($\gamma_{(X-T)_{G_k}}$) for each group, G_k, and for the corresponding situation of the number of dependent children reported in Tables 2a to 2e from the Appendix, we observe a persistency of the asymmetry in the distribution of taxes and of the after-tax salary income for Romania, the Czech Republic and Lithuania. The skewness is different from zero, but close to zero. Taking into consideration that the pre-tax salary income is symmetrically distributed around the mean of each group and the skewness is zero[5], then the change in the distribution of the after-tax salary income determined by the PIT regulations in these countries is significant. These results suggest the existence of some inequities in the way the PIT regulations contribute to the redistribution of the individuals' income taking part in the two groups.

[5] Bulgaria is the only exception. The gross salary income is symmetrically distributed, but the pre-tax salary income distribution is positively skewed because the social contributions are capped.

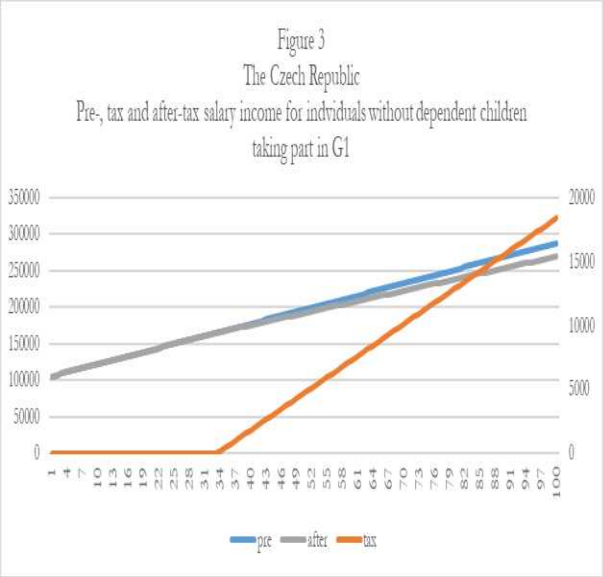
In **Romania**'s case, the distribution of tax liability for **G1** is positively skewed, whilst the distribution of the after-tax income is negatively skewed. For **G2**, the asymmetry of tax liability is negative and the asymmetry of the after-tax salary income is positive. The asymmetry is smaller for **G1** than for **G2**, which means that the inequity is lower among individuals in this group**.** Figures 1 and 2 illustrate the pre-, tax and after-tax salary income for individuals in groups **G1** and **G2**.

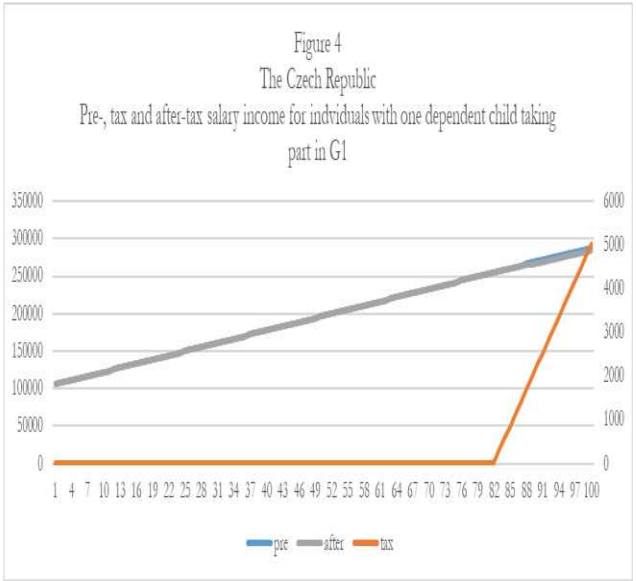




We can see for **G1** there is less individuals who have after-tax salary income which is close to the pre-tax salary income because of large tax deductions they benefit from and which contribute to a significant decrease in tax liability. For the most part of individuals taking part in **G1**, tax deductions are much lower and therefore the tax liability is higher and shifts the distribution of the salary income to the left. In the case of **G2**, the differences in the tax liability incurred by individuals of this group are not very high because the tax deductions are not high and a small number of individuals benefit from tax deductions, which shifts tax distribution to the left and after-tax salary income distribution to the right. Experts on taxation, please, make more comments if you consider necessary! We meet the same situation for employees having dependent children. The main difference is represented by the increasing asymmetry what it suggests that inequity is higher. The highest asymmetry we observe in the situation of employees with four or more dependent children. This is again the consequence of digressive tax deductions (based on a computation formula, not fixed amounts), allowed only up to an annual income of RON 36,000, which is found in group G2 of incomes, no matter the number of dependent children. For groups **G3** to **G6**, we do not notice asymmetries in after-tax salary income distribution which implies that tax rules are fair for all individuals in these groups, regardless of the number of children because no tax deductions are granted. If we consider the groups, $\mathbf{G_k}$, to represent people with a similar economic situation in terms of salary income (from lowest to highest) then asymmetry is a way to analyze horizontal equity. Therefore, we can state that tax rules generate horizontal inequity among low-salary income individuals.

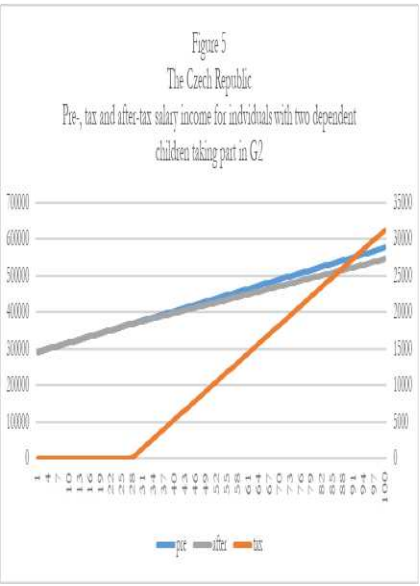
In the case of the **Czech Republic**, we notice greater asymmetry than in the case of Romania. It can be noticed that the Czech Republic is the only CEEC that uses tax credit for tax purposes, which is a more powerful incentive than the tax deduction, because it decreases directly the tax liability instead of the taxable base, before taxation. Asymmetry occurs in the distribution of **G1** after-tax salary income to employees without and with one dependent child and in the distribution of **G2** after-tax salary income to employees with two and more dependent children. This is due to the fact that, for each of the situations stated, the tax liability is changing from zero (for a significant number of employees in that group) to a positive amount, which, of course, generates asymmetry. Skewness could not be calculated for **G1** after-tax salary income to employees with more than two dependent children because the tax liability is zero. However, the asymmetry of after-tax salary income distribution is zero what it suggests the absence of tax inequity. Figures 3 and 4 show the pre-, tax and the after-tax salary income for group **G1** employees without dependent children and with one dependent child.

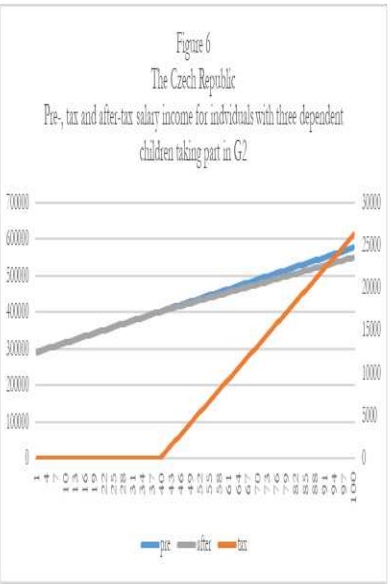


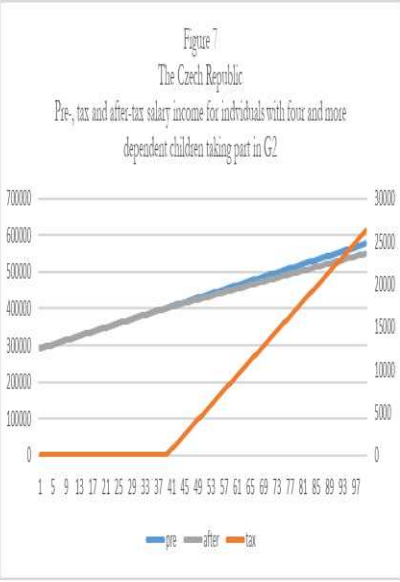


33% of employees without dependent children in **G1** benefit from total tax credit and thus tax liability is zero. In this situation, the pre and after-tax salary income are the same. The rest of the individuals in the group have a variable tax credit, which makes the tax liability to increase. The after-tax income is lower than the pre-tax salary income. These make the distribution of taxes to be positively skewed and the distribution of after-tax salary income to be negatively skewed. In the case of **G1** employees with one dependent child the share of those who benefit from total tax credit is 90%, which makes the distribution of the tax liability to be more positively skewed. In the end, the asymmetry in the after-tax distribution decreases what can be interpreted as contributing to greater horizontal tax equity.

For employees with more than two dependent children, the asymmetry in the distribution of tax liability and after-tax salary income appears for the group **G2** with incomes varying between the average annual salary and twice the average annual salary. Figures 5, 6 and 7 illustrate the pre-, tax and the after-tax salary income for group **G2** employees with two and more dependent children.







The number of individuals benefiting from total tax credit is of 27 in the case the employees with two dependent children and of 39 in the case of employees with three and more dependent children because the tax credit is capped to a maximum annual amount of CZK 60,300, no matter the number of dependents. The rest of individuals benefit from tax credits which makes the after-tax salary income to be lower than the pre-tax salary income. This fact leads to a positive asymmetry in the distribution of the tax liability and as a result to a negative asymmetry in the distribution of the after-tax salary income. Therefore, we can interpret these results as evidence of the existence of tax inequities generated by the PIT regulations. For groups **G3** to **G6**, we have not found evidence of horizontal inequity. The PIT regulatory framework does not affect the distribution of the after-tax salary income for high salaries.

For the case of **Lithuania**, we observe the same persistence of after-tax salary income distribution for individuals in group **G2**, regardless on the number of dependent children. Asymmetry is positive as a result of a negative skewed distribution of tax liability. The skewness of the after-tax salary income distribution is the same regardless of the number of dependent children because the personal tax deductions allowed are digressive, calculated based on a formula, not stated as fixed amounts. 20 employees in **G2** benefit of personal tax deductions, while for the rest of the group there is no personal tax deduction allowed when calculating the income tax, no matter the number of dependents. Only the tax deduction for dependent children is allowed for all groups of employees, depending on the number of dependents. It indicates the existence of horizontal inequity among individuals in this group. For employees with more than four dependent children the, we found negative asymmetry in the distribution of after-tax salary income for group **G2.** For the rest of groups, PIT regulations do

not change how salary income is distributed, which suggests the existence of horizontal equity among individuals in the same group.

For **Hungary**, we found negatively skewed distribution of after-tax salary income for employees in **G2** and **G3** groups with three or more dependent children. This situation is caused by the way in which tax deductions are granted in this country. For example, the tax liability of employees with three dependent children is zero for all those earning income ranging from minimum salary to average annual salary. The situation is similar, too, for employees with more than three dependent children who receive annual salary income of up to twice the average annual salary. For individuals in these situations, the PIT regulations do not change the distribution of after-tax salary income that remains symmetric. For the other groups, the results show no evidence of horizontal inequity.

In **Estonia**'s case, the results show a negative asymmetry in the distribution of the after-tax salary income for employees in **G1** with three and more than three dependent children. The minimum tax liability is zero. 10 employees with three dependent children have zero tax liability because of the high level of tax deductions, exceeding the taxable base (the pre-tax salary income). For 32 employees with four and more dependent children, the tax deductions are higher than the pre-tax salary income. Thus, the tax liability is zero. Therefore, the skewness of the distribution of taxes is higher for employees with four dependent children. For the rest of the groups, PIT regulatory framework does not cause tax inequities among individuals.

Latvia is in a similar situation to Estonia, with the exception that the negative asymmetry of the distribution of the after-tax salary income shows up for employees with two and three dependent children in group **G1**. 22 employees with two dependent children has zero tax liability, while 61 employees with three dependent children benefit from of tax deductions higher than the taxable base (the pre-tax salary income). Skewness of tax distribution is higher for employees with three dependent children, and, consequently, the after-tax salary income is more negatively skewed. Horizontal tax inequity is lower for employees with two dependent children. We have not found any other tax inequity among individuals in other groups.

Bulgaria is the only country where PIT regulations do not cause any horizontal inequity among individuals in the same group with one exception: for employees in group **G3** regardless of the number of dependent children, the pre-tax salary income is asymmetrically distributed. This is caused by the way how social contributions are calculated and that generates this asymmetry. The social security contribution is capped at BGN 31,200/year and this level of gross income is found in group **G3**, meaning that after exceeding this threshold, the total amount of social contributions increases, but at a lower rate. The gross salary income is symmetrically distributed and taxes do not change the distribution of the after-tax salary income.

4.2.Redistributive effects

In order to analyze the redistributive effects of PIT regulations in CEECs, we test hypotheses H_0 and H_1 by calculating the Gini coefficients of pre- and after-tax salary income and comparing them as described in section 3.2. We also calculate the percentage change of Gini coefficients to see the magnitude of the redistributive effects. We do the calculations for all individuals and for each group. Table 4 in the Appendix reports the results.

We can observe the largest redistributive effect in the case of the **Czech Republic**. The magnitude of the effect on the salary income of all individuals varies between 4.45% and 6.28%. The smallest effect is for employees without dependent children and the biggest effect is for employees with three and more dependent children. The results show that the Gini coefficients decrease which suggests an increase in the equality in the distribution of salary income. We also notice significant redistributive effects for all groups of individuals. This is explained by the fact that for the Czech Republic the results showed a more pronounced progressive taxation system than in other CEECs countries. Given that in this country the flat tax rate is applied, the progressivity is the effect of other PIT regulations. Another important aspect is that the second largest redistributive effect appears for individuals in group **G5** earning income that varies from fourth to fifth times the average annual salary.

The second most redistributive PIT regulatory framework is that of **Latvia**. The magnitude of effects varies between 0.93% for employees without dependent children and 7.30% for employees with four and more dependent children. The redistribution of the salary income is accomplished for all groups of individuals even though the magnitude differs. The biggest effects are met for people in groups **G1**, **G2** and **G3**, while for groups **G4**, **G5** and **G6** the redistribution decreases. The redistributive effects can also be attributed to greater progressivity of taxation. The effective tax rate varies significantly among groups of individuals.

The redistributive effects in **Estonia**'s, **Hungary**'s and **Lithuania**'s cases are comparable in magnitude, the results being quite close. The effects are not too large, but not too small either. The redistribution is achieved for all groups of employees.

The smallest redistributive effects can be noticed for **Bulgaria**'s case. The magnitude of the effect varies between 0% and 0.21% for the all individuals' salary income. This means that the inequality of the income distribution slightly changes and that the PIT regulatory framework does not have redistributive effects due to poor progressivity of taxation. For employees without dependent children, there is no redistributive effect in their salary income. This is because they do not benefit from tax deductions or exemptions and, therefore, the effective tax rate equals the flat statutory tax rate which does not vary among groups of individuals. Some redistributive effects can be observed for employees with one dependent child and more than one dependent children. This is can be explained by the fact that PIT regulatory framework allows weak progressivity. The effective tax rate ranges around 9% and the changes from one group to another are very small. The largest redistributive effects are seen for individuals in group **G1**.

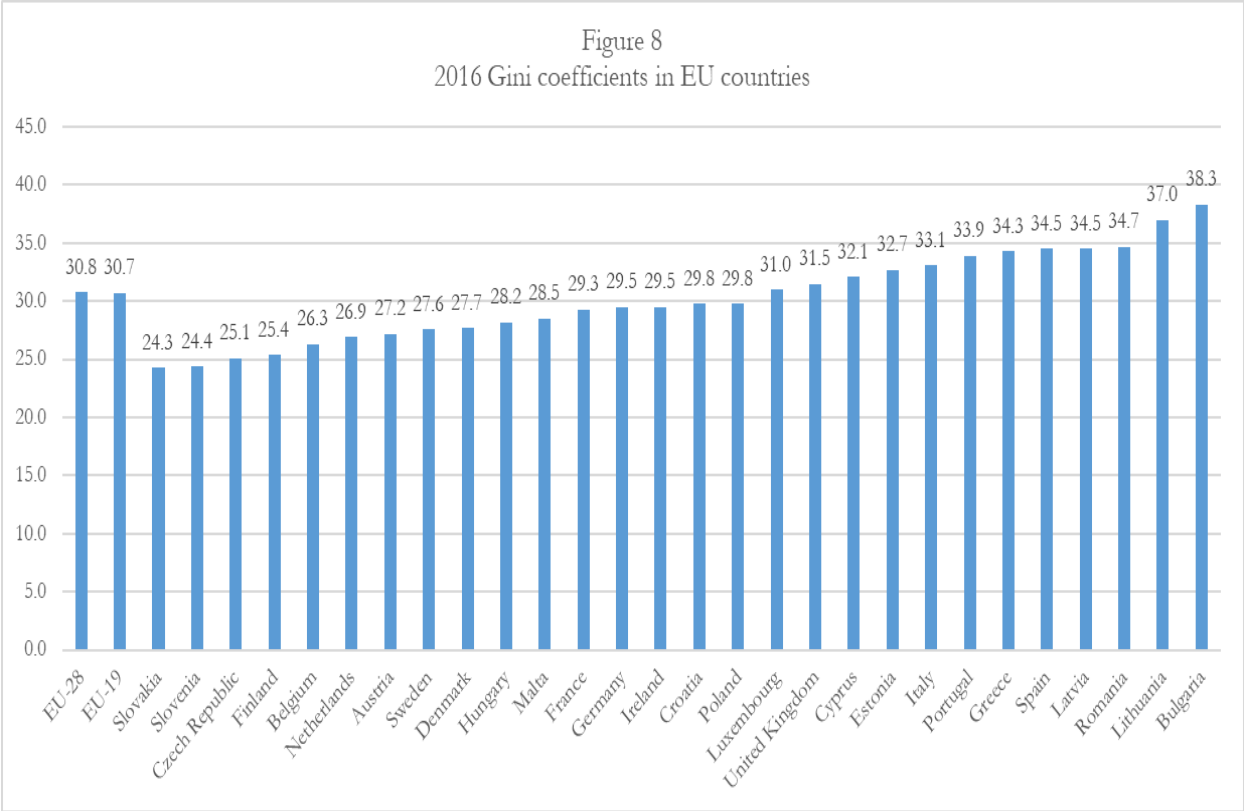
The second smallest redistributive effect has been observed for **Romania**. The percentage change of Gini coefficients ranges from 0.34% to 0.93%. This indicates small changes in the inequality of salary income distribution. Unlike Bulgaria's case, the redistribution is accomplished for individuals in groups **G1** and **G2**. For the rest of groups, the results show no redistributive effects regardless of number of dependent children. The observed redistributive effects for **G1** and **G2** can also be correlated with the progressivity of the effective tax rate which occurs only for these groups. For groups **G2** to **G6**, the effective tax rate is similar to the statutory tax rate. This implies that no tax deductions or exemptions are granted for employees within these groups.

When analyzing the results on redistributive effects, we believe that it is important to take into account the results on tax equity, too, because reducing inequality in income distribution can be affected by

unfair PIT regulations. Table 5 in the Appendix summarizes the results on the redistributive effects captured by the percentage change in the coefficients and tax equity measured by skewness. We are interested in those situations where the redistribution determined by the PIT regulatory frameworks is accompanied by horizontal inequity among individuals in the group. In this respect, we have found for **Romania** that in 10 situations when redistribution is achieved is associated with unfair PIT regulations which generates horizontal inequity among employees in the same group. Considering that 10 is the maximum number of situations when distribution is accomplished, we can state that Romania has the most unfair redistribution. The increasing equality in the distribution of salary income takes place at a cost of horizontal inequity. **Estonia** and **Latvia** are the countries with the lowest ratio between unfair redistribution and total redistribution situations. The ratio is of 0.07. Then we can mention **Hungary** with the second lowest ratio. **Bulgaria** and the **Czech Republic** have higher ratios of unfair redistributive effects of 0.17 and respectively, of 0.19 while **Lithuania** is the second among CEECs with the biggest ratio between unfair redistributive effects and total redistributive effects. We can also note that the unfair redistributive effects occurs for people in the first two groups with income ranging from the minimum annual salary to twice the average annual salary. Only in Bulgaria's case, the unfair redistribution is achieved for employees in group **G3** about which we have already argued.

5.Policy implications and recommendations

We believe that based on the results of our study several policy implications can be formulated. But, before discussing them, we would like to show that revenue collected by governments of CEECs from the personal income tax have a smaller share to total tax revenue. Table 6 in the Appendix reports the breakdown of tax revenue by country in 2016. The taxes on individual or household income in CEECs represent about half of the value recorded at EU28. Latvia and Estonia have the biggest share. If we compare it to the value added type taxes, we can see that the latter have a much higher value than the one registered at EU28. These results suggest that PIT is not an important means of collecting revenue in CEECs. Governments seem to rely more on taxes on consumption than on income. Therefore, the importance of PIT might be underestimated. However, there are several reasons why PIT should be given much more attention by governments: (i) on one hand, it is widely recognized that taxes on income can have higher output gap elasticities than taxes on consumption especially when they reflect progressive rate structure for PIT (Baunsgaard and Symansky, 2009) which make them a better automatic stabilizer capable of converting periods of likely recession into periods of normal growth (Cohen and Follette, 2000); (ii) on other hand, PIT regulations can contribute to the decrease in the inequality of income distribution among people or households by promoting progressive taxation through tax rates structure or through other regulations as in the case of CEECs. Related to this aspect, Figure 8 illustrates Gini coefficients of disposable income in European Union countries for 2016.

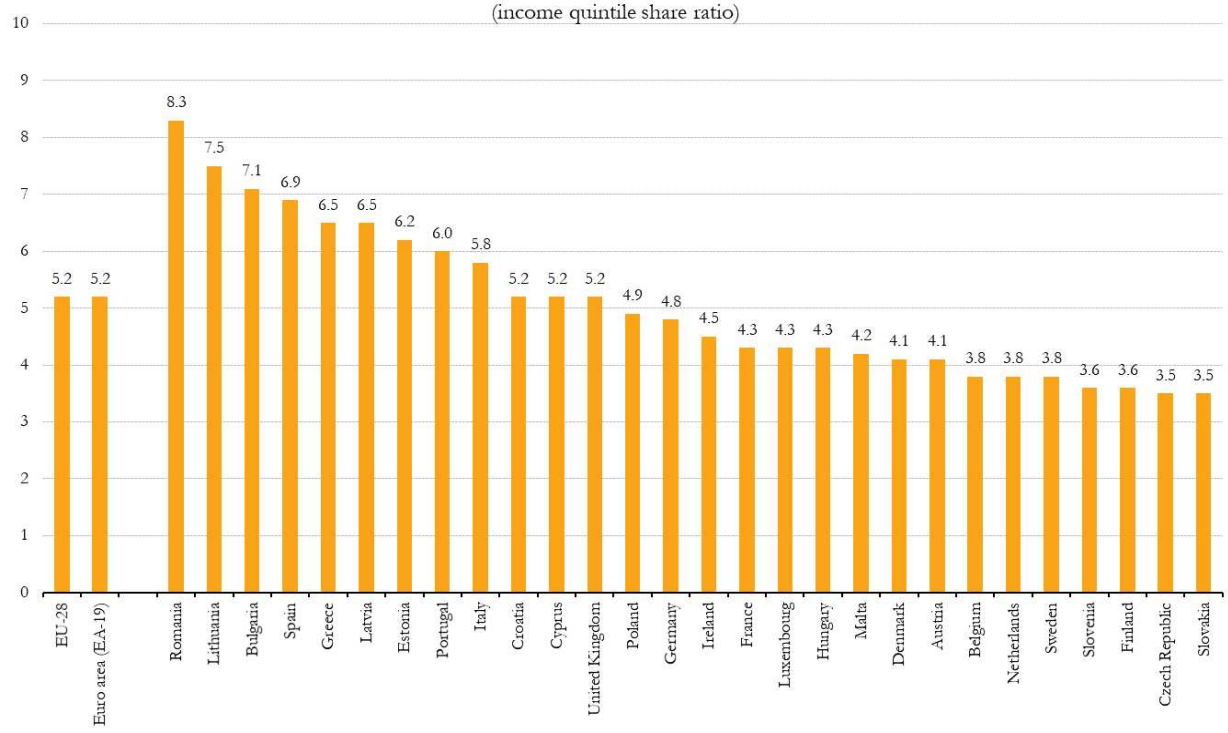


Source: Eurostat

Although the Gini coefficients are not so high, we can observe that five CEECs, namely Estonia, Latvia, Romania, Lithuania and Bulgaria that report larger coefficients than of EU28 and euro area (EU19). Governments in these countries should be concerned about the fact that Gini coefficients are the four largest in EU (excepting Estonia). Our study revealed for Bulgaria and Romania that PIT regulations have the smallest redistributive effect due to weak progressivity. The Czech Republic and Hungary have lower Gini coefficients than of EU28 and euro area. The first has the third smallest coefficient among EU countries that indicates higher equality of income distribution. We remember that for the Czech Republic we found the biggest redistributive effects due to a stronger progressivity determined by PIT regulations in this country. Hungary is also one of the countries with important redistributive effects and with a pronounced progressivity especially for employees with more dependent children.

Figure 9 depicts inequality of income distribution in 2015 in EU countries as quantile share ratios. We observe that biggest ratios for Romania, Lithuania, Bulgaria, Latvia and Estonia. The inequality in these countries is higher than of EU28 and euro area. Moreover, Romania, Lithuania and Bulgaria have the highest ratios among all EU countries. Hungary and the Czech Republic have ratios smaller than of EU28 and EU19 and the inequality in the Czech Republic was the second smallest in EU.

Figure 9
Inequality of income distribution, 2015
(income quintile share ratio)



Source: Eurostat

Taking into account all this evidence, we can state that governments of these countries should pay more attention to the problem of income redistribution and PIT regulations can be a very important and useful tool in achieving a more equal distribution of income in society. CEECs governments are rather concerned about tax-cuts for lower-income individuals to preserve their disposable income and purchasing power than about redistributive effects. If government would not want to change the flat tax rate and introduce a progressive tax rate schedule, the could use the tax deductions, tax allowances, tax exemptions or tax credits as means to achieve a stronger progressivity that can lead to more pronounced redistributive effects. The Czech Republic can be inspiring in doing so!

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Appendix

Table 1 Summary of the PIT regulations in CEECs

Country (currency)	Bulgaria (BGN)	Czech Republic (CZK)	Estonia (EUR)	Hungary (HUF)	Latvia (EUR)	Lithuania (EUR)	Romania (RON)
Monthly minimum salary	420	9,900	430	111,000	370	350	1,250
Monthly average salary	950	27,006	1146	244787	859	784	2,681
Annual minimum salary	5,040	118,800	5,160	1,332,000	4,440	4,200	15,000
Annual average salary	11,400	324,072	13,752	2,937,444	10,308	9,408	32,172
Total rate of employee's social contributions, out of which:	**12.90%**	**11.00%**	**3.60%**	**18.50%**	**10.50%**	**9.00%**	**16.50%**
- Social security contributions	7.90%	6.50%	2%	10.00%	7.51%	3%	10.50%
- Healthcare insurance contribution	3.20%	4.50%	0.00%	8.50%		6%	5.50%
- Unemployment contribution	0.40%	0.00%	1.60%	0.00%	0.65%	0%	0.50%
- Other social contributions	1.40%	0.00%	0%	0%	2.34%	0%	0.00%
Monthly threshold for social security contribution	2,600	-	-	-		-	13,405
Annual threshold for social security contribution	31,200	1,296,288	-	-		-	160,860
Tax deduction allowed for dependent persons	**YES**	NO	**YES**	**YES**	**YES**	**YES**	**YES**
Tax credit for dependent persons	NO	**YES**	NO	NO	NO	NO	NO
- Personal deduction /year (no children)	0	24,840	2,040	-	900	2,400-0.34×(GI-4,200)	3,600
- Personal deduction /year (one child)	200	38,244	2,040	400,020	3,000	2,400-0.34×(GI-4,200) +1,440/2	4,800
- Personal deduction /year (two children)	400	55,248	3,888	999,960	5,100	2,400-0.34×(GI-4,200) +1,440×2/2	6,000
- Personal deduction /year (three children)	600	75,852	5,736	3,960,000	7,200	2,400-0.34×(GI-4,200) +1,440×3/2	7,200
- Personal deduction /year (four or more children)	600	96,456	7,584	5,280,000	9,300	2,400-0.34×(GI-4,200)+1,440×4/2	9,600
Maximum threshold for annual tax deduction	-	60,300	-	-	-	-	-
Tax rate	**10%**	**15%**	**20%**	**15%**	**23%**	**15%**	**16%**
Surcharge tax rate	-	7%		-	-	-	-
Surcharge tax applied for income exceeding:		1,296,288		-	-	-	-

Table 2a Descriptive statistics for pre-tax salary income, after-tax salary income and salary income tax

		BULGARIA			CZECH REPUBLIC			ESTONIA			HUNGARY			LATVIA			LITHUANIA			ROMANIA		
		Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax
Group	Statistics	S0: Employee without dependent children																				
	Mean	7159.6	716.0	6443.7	197078.0	6223.6	190854.4	9115.6	1415.1	7700.5	1739798.4	260969.8	1478828.7	6599.7	1310.9	5288.8	6191.6	732.2	5459.5	19694.3	2762.6	16931.7
	Median	7159.6	716.0	6443.7	197078.0	4721.7	192356.3	9115.6	1415.1	7700.5	1739798.4	260969.8	1478828.7	6599.7	1310.9	5288.8	6191.6	732.2	5459.5	19694.3	2753.8	16940.5
	St.dev	1623.3	162.3	1461.0	53537.1	6218.1	47575.9	2427.2	485.4	1941.8	383431.4	57514.7	325916.7	1539.0	354.0	1185.1	1388.8	293.0	1095.8	4201.9	820.0	3382.1
	Minim	4389.8	439.0	3950.9	105732.0	0.0	105732.0	4974.2	586.8	4387.4	1085580.0	162837.0	922743.0	3973.8	707.0	3266.8	3822.0	232.2	3589.8	12525.0	1428.0	11097.0
	Maxim	9929.4	992.9	8936.5	288424.1	18423.6	270000.5	13256.9	2243.4	11013.5	2394016.9	359102.5	2034914.3	9225.7	1914.9	7310.8	8561.3	1232.1	7329.1	26863.6	4175.7	22687.9
G1	Skewness	0.00000	0.00000	0.00000	0.00000	0.49865	-0.08900	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.04267	-0.01084
	Mean	14943.7	1494.4	13449.4	434078.2	40271.7	393806.5	19951.7	3582.3	16369.3	3602995.4	540449.3	3062546.1	13884.6	2986.5	10898.2	12884.7	1987.6	10897.1	40429.7	6462.1	33967.7
	Median	14943.7	1494.4	13449.4	434078.2	40271.7	393806.5	19951.7	3582.3	16369.3	3602995.4	540449.3	3062546.1	13884.6	2986.5	10898.2	12884.7	1996.4	10888.3	40429.7	6468.8	33961.0
	St.dev	2880.7	288.1	2592.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	398.6	2085.6	7793.5	1257.9	6535.9
	Minim	10028.7	1002.9	9025.8	291308.3	18856.2	272452.1	13389.5	2269.9	11119.6	2417957.0	362693.6	2055263.5	9317.9	1936.1	7381.8	8646.9	1250.2	7396.7	27132.3	4229.0	22903.3
	Maxim	19858.8	1985.9	17872.9	576848.2	61687.2	515160.9	26513.9	4894.8	21619.1	4788033.7	718205.1	4069828.7	18451.3	4036.8	14414.5	17122.6	2653.1	14469.5	53727.2	8596.4	45130.9
G2	Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.09428	0.01669	0.00000	-0.02646	0.00488
	Mean	24905.5	2490.6	22415.0	722502.3	83535.3	638967.0	33208.6	6233.7	26974.9	5997012.2	899551.8	5097460.4	23110.3	5108.4	18001.9	21446.0	3323.0	18123.1	67293.4	10766.9	56526.4
	Median	24873.1	2487.3	22385.8	722502.3	83535.3	638967.0	33208.6	6233.7	26974.9	5997012.2	899551.8	5097460.4	23110.3	5108.4	18001.9	21446.0	3323.0	18123.1	67293.4	10766.9	56526.4
	St.dev	2927.3	292.7	2634.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
	Minim	19958.1	1995.8	17962.3	579732.4	62119.9	517612.5	26646.4	4921.3	21725.1	4811973.9	721796.1	4090177.8	18543.6	4058.0	14485.6	17208.2	2666.3	14541.9	53995.9	8639.3	45356.5
	Maxim	30025.2	3002.5	27022.7	865272.2	104950.8	760321.4	39770.8	7546.2	32224.6	7182050.6	1077307.6	6104743.0	27677.0	6158.7	21518.3	25683.8	3979.6	21704.3	80590.9	12894.5	67696.3
G3	Skewness	0.03684	0.03684	0.03684	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	Mean	35494.4	3549.4	31944.9	1010926.4	126799.0	884127.4	46465.5	8885.1	37580.4	8391029.1	1258654.4	7132374.7	32335.9	7230.3	25105.7	30007.3	4649.5	25357.8	94157.0	15065.1	79091.9
	Median	35494.4	3549.4	31944.9	1010926.4	126799.0	884127.4	46465.5	8885.1	37580.4	8391029.1	1258654.4	7132374.7	32335.9	7230.3	25105.7	30007.3	4649.5	25357.8	94157.0	15065.1	79091.9
	St.dev	3141.9	314.2	2827.8	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
	Minim	30133.5	3013.4	27120.2	868156.5	105383.5	762773.0	39903.4	7572.7	32330.7	7205990.7	1080898.6	6125092.1	27769.2	6179.9	21589.3	25769.5	3992.8	21776.6	80859.5	12937.5	67922.0
	Maxim	40855.2	4085.5	36769.7	1153696.3	148214.4	1005481.9	53027.7	10197.5	42830.2	9576067.4	1436410.1	8139657.3	36902.6	8280.6	28622.0	34245.1	5306.1	28939.0	107454.5	17192.7	90261.8
G4	Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	Mean	46324.4	4632.4	41691.9	1309988.1	183114.2	1126874.0	59722.5	11536.5	48186.0	10785046.0	1617756.9	9167289.1	41561.6	9352.2	32209.4	38568.6	5976.0	32592.6	121020.6	19363.3	101657.3
	Median	46324.4	4632.4	41691.9	1309988.1	183114.2	1126874.0	59722.5	11536.5	48186.0	10785046.0	1617756.9	9167289.1	41561.6	9352.2	32209.4	38568.6	5976.0	32592.6	121020.6	19363.3	101657.3
	St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
	Minim	40963.5	4096.4	36867.2	1156791.2	148905.5	1007885.7	53160.3	10224.1	42936.2	9600007.6	1440001.1	8160006.5	36994.9	8301.8	28693.1	34330.7	5319.4	29011.4	107723.1	17235.7	90487.4
	Maxim	51685.2	5168.5	46516.7	1463185.1	217322.8	1245862.3	66284.6	12848.9	53435.7	11970084.3	1795512.6	10174571.7	46128.3	10402.5	35725.8	42806.4	6632.6	36173.8	134318.1	21490.9	112827.2
G5	Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	Mean	57154.4	5715.4	51438.9	1619476.9	252222.5	1367254.4	72979.4	14187.9	58791.5	13179062.8	1976859.4	11202203.4	50787.3	11474.1	39313.2	47129.8	7302.5	39827.3	149590.1	23934.4	125655.7
	Median	57154.4	5715.4	51438.9	1619476.9	252222.5	1367254.4	72979.4	14187.9	58791.5	13179062.8	1976859.4	11202203.4	50787.3	11474.1	39313.2	47129.8	7302.5	39827.3	149590.1	23934.4	125655.7
	St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	8773.6	1403.8	7369.8
	Minim	51793.5	5179.4	46614.2	1466280.0	218013.9	1248266.1	66417.2	12875.4	53541.8	11994024.5	1799103.7	10194920.8	46220.6	10423.7	35796.8	42892.0	6645.9	36246.1	134620.5	21539.3	113081.2
	Maxim	62515.2	6251.5	56263.7	1772673.8	286431.2	1486242.7	79541.6	15500.3	64041.3	14364101.2	2154615.2	12209486.0	55354.0	12524.4	42829.5	51367.7	7959.2	43408.5	164559.8	26329.6	138230.2
G6	Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 2b Descriptive statistics for pre-tax salary income, after-tax salary income and salary income tax

	BULGARIA			CZECH REPUBLIC			ESTONIA			HUNGARY			LATVIA			LITHUANIA			ROMANIA		
	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax
Statistics	S1: Employee having one dependent child																				
Mean	7159.6	696.0	6463.7	197078.0	480.4	196597.7	9115.6	1415.1	7700.5	1739798.4	200966.8	1538831.7	6599.7	827.9	5771.8	6191.6	624.2	5567.5	19694.3	2633.1	17061.2
Median	7159.6	696.0	6463.7	197078.0	0.0	197078.0	9115.6	1415.1	7700.5	1739798.4	200966.8	1538831.7	6599.7	827.9	5771.8	6191.6	624.2	5567.5	19694.3	2621.4	17072.9
St.dev	1623.3	162.3	1461.0	53537.1	1197.9	52813.2	2427.2	485.4	1941.8	383431.4	57514.7	325916.7	1539.0	354.0	1185.1	1388.8	293.0	1095.8	4201.9	869.4	3332.9
Minim	4389.8	419.0	3970.9	105732.0	0.0	105732.0	4974.2	586.8	4387.4	1085580.0	102834.0	982746.0	3973.8	224.0	3749.8	3822.0	124.2	3697.8	12525.0	1236.0	11289.0
Maxim	9929.4	972.9	8956.5	288424.1	5019.6	283404.5	13256.9	2243.4	11013.5	2394016.9	299099.5	2094917.3	9225.7	1431.9	7793.8	8561.3	1124.1	7437.1	26863.6	4134.9	22728.8
Skewness	0.00000	0.00000	0.00000	0.00000	2.53386	-0.03579	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.05313	-0.01471
Mean	14943.7	1474.4	13469.4	434078.2	26867.7	407210.5	19951.7	3582.3	16369.3	3602995.4	480446.3	3122549.1	13884.6	2503.5	11381.2	12884.7	1879.6	11005.1	40429.7	6459.9	33969.9
Median	14943.7	1474.4	13469.4	434078.2	26867.7	407210.5	19951.7	3582.3	16369.3	3602995.4	480446.3	3122549.1	13884.6	2503.5	11381.2	12884.7	1888.4	10996.3	40429.7	6468.8	33961.0
St.dev	2880.7	288.1	2592.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	398.6	2085.6	7793.5	1261.5	6532.3
Minim	10028.7	982.9	9045.8	291308.3	5452.2	285856.1	13389.5	2269.9	11119.6	2417957.0	302690.6	2115266.5	9317.9	1453.1	7864.8	8646.9	1142.2	7504.7	27132.3	4191.6	22940.7
Maxim	19858.8	1965.9	17892.9	576848.2	48283.2	528564.9	26513.9	4894.8	21619.1	4788033.7	658202.1	4129831.7	18451.3	3553.8	14897.5	17122.6	2545.1	14577.5	53727.2	8596.4	45130.9
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.09428	0.01669	0.00000	-0.03560	0.00649
Mean	24905.5	2470.6	22435.0	722502.3	70131.3	652371.0	33208.6	6233.7	26974.9	5997012.2	839548.8	5157463.4	23110.3	4625.4	18484.9	21446.0	3215.0	18231.1	67293.4	10766.9	56526.4
Median	24873.1	2467.3	22405.8	722502.3	70131.3	652371.0	33208.6	6233.7	26974.9	5997012.2	839548.8	5157463.4	23110.3	4625.4	18484.9	21446.0	3215.0	18231.1	67293.4	10766.9	56526.4
St.dev	2927.3	292.7	2634.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	19958.1	1975.8	17982.3	579732.4	48715.9	531016.5	26646.4	4921.3	21725.1	4811973.9	661793.1	4150180.8	18543.6	3575.0	14968.6	17208.2	2558.3	14649.9	53995.9	8639.3	45356.5
Maxim	30025.2	2982.5	27042.7	865272.2	91546.8	773725.4	39770.8	7546.2	32224.6	7182050.6	1017304.6	6164746.0	27677.0	5675.7	22001.3	25683.8	3871.6	21812.3	80590.9	12894.5	67696.3
Skewness	0.03684	0.03684	0.03684	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	35494.4	3529.4	31964.9	1010926.4	113395.0	897531.4	46465.5	8885.1	37580.4	8391029.1	1198651.4	7192377.7	32335.9	6747.3	25588.7	30007.3	4541.5	25465.8	94157.0	15065.1	79091.9
Median	35494.4	3529.4	31964.9	1010926.4	113395.0	897531.4	46465.5	8885.1	37580.4	8391029.1	1198651.4	7192377.7	32335.9	6747.3	25588.7	30007.3	4541.5	25465.8	94157.0	15065.1	79091.9
St.dev	3141.9	314.2	2827.8	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	30133.5	2993.4	27140.2	868156.5	91979.5	776177.0	39903.4	7572.7	32330.7	7205990.7	1020895.6	6185095.1	27769.2	5696.9	22072.3	25769.5	3884.8	21884.6	80859.5	12937.5	67922.0
Maxim	40855.2	4065.5	36789.7	1153696.3	134810.4	1018885.9	53027.7	10197.5	42830.2	9576067.4	1376407.1	8199660.3	36902.6	7797.6	29105.0	34245.1	5198.1	29047.0	107454.5	17192.7	90261.8
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	46324.4	4612.4	41711.9	1309988.1	169710.2	1140278.0	59722.5	11536.5	48186.0	10785046.0	1557753.9	9227292.1	41561.6	8869.2	32692.4	38568.6	5868.0	32700.6	121020.6	19363.3	101657.3
Median	46324.4	4612.4	41711.9	1309988.1	169710.2	1140278.0	59722.5	11536.5	48186.0	10785046.0	1557753.9	9227292.1	41561.6	8869.2	32692.4	38568.6	5868.0	32700.6	121020.6	19363.3	101657.3
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	40963.5	4076.4	36887.2	1156791.2	135501.5	1021289.7	53160.3	10224.1	42936.2	9600007.6	1379998.1	8220009.5	36994.9	7818.8	29176.1	34330.7	5211.4	29119.4	107723.1	17235.7	90487.4
Maxim	51685.2	5148.5	46536.7	1463185.1	203918.8	1259266.3	66284.6	12848.9	53435.7	11970084.3	1735509.6	10234574.7	46128.3	9919.5	36208.8	42806.4	6524.6	36281.8	134318.1	21490.9	112827.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	57154.4	5695.4	51458.9	1619476.9	238818.5	1380658.4	72979.4	14187.9	58791.5	13179062.8	1916856.4	11262206.4	50787.3	10991.1	39796.2	47129.8	7194.5	39935.3	149590.1	23934.4	125655.7
Median	57154.4	5695.4	51458.9	1619476.9	238818.5	1380658.4	72979.4	14187.9	58791.5	13179062.8	1916856.4	11262206.4	50787.3	10991.1	39796.2	47129.8	7194.5	39935.3	149590.1	23934.4	125655.7
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	8773.6	1403.8	7369.8
Minim	51793.5	5159.4	46634.2	1466280.0	204609.9	1261670.1	66417.2	12875.4	53541.8	11994024.5	1739100.7	10254923.8	46220.6	9940.7	36279.8	42892.0	6537.9	36354.1	134620.5	21539.3	113081.2
Maxim	62515.2	6231.5	56283.7	1772673.8	273027.2	1499646.7	79541.6	15500.3	64041.3	14364101.2	2094612.2	12269489.0	55354.0	12041.4	43312.5	51367.7	7851.2	43516.5	164559.8	26329.6	138230.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 2c Descriptive statistics for pre-tax salary income, after-tax salary income and salary income tax

	BULGARIA			CZECH REPUBLIC			ESTONIA			HUNGARY			LATVIA			LITHUANIA			ROMANIA		
	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax
Statistics	S4: Employee having two dependent children																				
Mean	7159.6	676.0	6483.7	197078.0	0.0	197078.0	9115.6	1045.5	8070.1	1739798.4	110975.8	1628822.7	6599.7	373.7	6226.0	6191.6	516.2	5675.5	19694.3	2503.7	17190.7
Median	7159.6	676.0	6483.7	197078.0	0.0	197078.0	9115.6	1045.5	8070.1	1739798.4	110975.8	1628822.7	6599.7	344.9	6254.8	6191.6	516.2	5675.5	19694.3	2489.0	17205.3
St.dev	1623.3	162.3	1461.0	53537.1	0.0	53537.1	2427.2	485.4	1941.8	383431.4	57514.7	325916.7	1539.0	315.0	1228.9	1388.8	293.0	1095.8	4201.9	918.7	3283.8
Minim	4389.8	399.0	3990.9	105732.0	0.0	105732.0	4974.2	217.2	4757.0	1085580.0	12843.0	1072737.0	3973.8	0.0	3973.8	3822.0	16.2	3805.8	12525.0	1044.0	11481.0
Maxim	9929.4	952.9	8976.5	288424.1	0.0	288424.1	13256.9	1873.8	11383.1	2394016.9	209108.5	2184908.3	9225.7	948.9	8276.8	8561.3	1016.1	7545.1	26863.6	4094.0	22769.6
Skewness	0.00000	0.00000	0.00000	0.00000	na	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.26514	-0.09266	0.00000	0.00000	0.00000	0.00000	0.06228	-0.01873
Mean	14943.7	1454.4	13489.4	434078.2	11464.2	422614.1	19951.7	3212.7	16738.9	3602995.4	390455.3	3212540.1	13884.6	2020.5	11864.2	12884.7	1771.6	11113.1	40429.7	6457.6	33972.1
Median	14943.7	1454.4	13489.4	434078.2	9863.7	424214.5	19951.7	3212.7	16738.9	3602995.4	390455.3	3212540.1	13884.6	2020.5	11864.2	12884.7	1780.4	11104.3	40429.7	6468.8	33961.0
St.dev	2880.7	288.1	2592.6	83676.1	10506.2	73438.6	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	398.6	2085.6	7793.5	1265.3	6528.7
Minim	10028.7	962.9	9065.8	291308.3	0.0	291308.3	13389.5	1900.3	11489.2	2417957.0	212699.6	2205257.5	9317.9	970.1	8347.8	8646.9	1034.2	7612.7	27132.3	4154.2	22978.1
Maxim	19858.8	1945.9	17912.9	576848.2	31279.2	545568.9	26513.9	4525.2	21988.7	4788033.7	568211.1	4219822.7	18451.3	3070.8	15380.5	17122.6	2437.1	14685.5	53727.2	8596.4	45130.9
Skewness	0.00000	0.00000	0.00000	0.00000	0.37379	-0.07282	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.09428	0.01669	0.00000	-0.04488	0.00810
Mean	24905.5	2450.6	22455.0	722502.3	53127.3	669375.0	33208.6	5864.1	27344.5	5997012.2	749557.8	5247454.4	23110.3	4142.4	18967.9	21446.0	3107.0	18339.1	67293.4	10766.9	56526.4
Median	24873.1	2447.3	22425.8	722502.3	53127.3	669375.0	33208.6	5864.1	27344.5	5997012.2	749557.8	5247454.4	23110.3	4142.4	18967.9	21446.0	3107.0	18339.1	67293.4	10766.9	56526.4
St.dev	2927.3	292.7	2634.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	19958.1	1955.8	18002.3	579732.4	31711.9	548020.5	26646.4	4551.7	22094.7	4811973.9	571802.1	4240171.8	18543.6	3092.0	15451.6	17208.2	2450.3	14757.9	53995.9	8639.3	45356.5
Maxim	30025.2	2962.5	27062.7	865272.2	74542.8	790729.4	39770.8	7176.6	32594.2	7182050.6	927313.6	6254737.0	27677.0	5192.7	22484.3	25683.8	3763.6	21920.3	80590.9	12894.5	67696.3
Skewness	0.03684	0.03684	0.03684	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	35494.4	3509.4	31984.9	1010926.4	96391.0	914535.4	46465.5	8515.5	37950.0	8391029.1	1108660.4	7282368.7	32335.9	6264.3	26071.7	30007.3	4433.5	25573.8	94157.0	15065.1	79091.9
Median	35494.4	3509.4	31984.9	1010926.4	96391.0	914535.4	46465.5	8515.5	37950.0	8391029.1	1108660.4	7282368.7	32335.9	6264.3	26071.7	30007.3	4433.5	25573.8	94157.0	15065.1	79091.9
St.dev	3141.9	314.2	2827.8	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	30133.5	2973.4	27160.2	868156.5	74975.5	793181.0	39903.4	7203.1	32700.3	7205990.7	930904.6	6275086.1	27769.2	5213.9	22555.3	25769.5	3776.8	21992.6	80859.5	12937.5	67922.0
Maxim	40855.2	4045.5	36809.7	1153696.3	117806.4	1035889.9	53027.7	9827.9	43199.8	9576067.4	1286416.1	8289651.3	36902.6	7314.6	29588.0	34245.1	5090.1	29155.0	107454.5	17192.7	90261.8
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	46324.4	4592.4	41731.9	1309988.1	152706.2	1157282.0	59722.5	11166.9	48555.6	10785046.0	1467762.9	9317283.1	41561.6	8386.2	33175.4	38568.6	5760.0	32808.6	121020.6	19363.3	101657.3
Median	46324.4	4592.4	41731.9	1309988.1	152706.2	1157282.0	59722.5	11166.9	48555.6	10785046.0	1467762.9	9317283.1	41561.6	8386.2	33175.4	38568.6	5760.0	32808.6	121020.6	19363.3	101657.3
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	40963.5	4056.4	36907.2	1156791.2	118497.5	1038293.7	53160.3	9854.5	43305.8	9600007.6	1290007.1	8310000.5	36994.9	7335.8	29659.1	34330.7	5103.4	29227.4	107723.1	17235.7	90487.4
Maxim	51685.2	5128.5	46556.7	1463185.1	186914.8	1276270.3	66284.6	12479.3	53805.3	11970084.3	1645518.6	10324565.7	46128.3	9436.5	36691.8	42806.4	6416.6	36389.8	134318.1	21490.9	112827.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	57154.4	5675.4	51478.9	1619476.9	221814.5	1397662.4	72979.4	13818.3	59161.1	13179062.8	1826865.4	11352197.4	50787.3	10508.1	40279.2	47129.8	7086.5	40043.3	149590.1	23934.4	125655.7
Median	57154.4	5675.4	51478.9	1619476.9	221814.5	1397662.4	72979.4	13818.3	59161.1	13179062.8	1826865.4	11352197.4	50787.3	10508.1	40279.2	47129.8	7086.5	40043.3	149590.1	23934.4	125655.7
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	8773.6	1403.8	7369.8
Minim	51793.5	5139.4	46654.2	1466280.0	187605.9	1278674.1	66417.2	12505.8	53911.4	11994024.5	1649109.7	10344914.8	46220.6	9457.7	36762.8	42892.0	6429.9	36462.1	134620.5	21539.3	113081.2
Maxim	62515.2	6211.5	56303.7	1772673.8	256023.2	1516650.7	79541.6	15130.7	64410.9	14364101.2	2004621.2	12359480.0	55354.0	11558.4	43795.5	51367.7	7743.2	43624.5	164559.8	26329.6	138230.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 2d Descriptive statistics for pre-tax salary income, after-tax salary income and salary income tax

	BULGARIA			CZECH REPUBLIC			ESTONIA			HUNGARY			LATVIA			LITHUANIA			ROMANIA		
	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax
Statistics	S4: Employee having three dependent children																				
Mean	7159.6	656.0	6503.7	197078.0	0.0	197078.0	9115.6	683.6	8432.0	1739798.4	0.0	1739798.4	6599.7	91.3	6508.4	6191.6	412.8	5778.8	19694.3	2374.2	17320.1
Median	7159.6	656.0	6503.7	197078.0	0.0	197078.0	9115.6	675.9	8439.7	1739798.4	0.0	1739798.4	6599.7	0.0	6599.7	6191.6	408.2	5783.5	19694.3	2356.6	17337.7
St.dev	1623.3	162.3	1461.0	53537.1	0.0	53537.1	2427.2	473.5	1954.5	383431.4	0.0	383431.4	1539.0	143.5	1423.5	1388.8	285.9	1103.5	4201.9	968.1	3234.7
Minim	4389.8	379.0	4010.9	105732.0	0.0	105732.0	4974.2	0.0	4974.2	1085580.0	0.0	1085580.0	3973.8	0.0	3973.8	3822.0	0.0	3822.0	12525.0	852.0	11673.0
Maxim	9929.4	932.9	8996.5	288424.1	0.0	288424.1	13256.9	1504.2	11752.7	2394016.9	0.0	2394016.9	9225.7	465.9	8759.8	8561.3	908.1	7653.1	26863.6	4053.2	22810.4
Skewness	0.00000	0.00000	0.00000	0.00000	na	0.00000	0.00000	0.06989	-0.02041	0.00000	na	0.00000	0.00000	1.33268	-0.14320	0.00000	0.06968	-0.02180	0.00000	0.07035	-0.02289
Mean	14943.7	1434.4	13509.4	434078.2	8081.4	425996.9	19951.7	2843.1	17108.5	3602995.4	22105.2	3580890.2	13884.6	1537.5	12347.2	12884.7	1663.6	11221.1	40429.7	6455.4	33974.3
Median	14943.7	1434.4	13509.4	434078.2	4811.7	429266.5	19951.7	2843.1	17108.5	3602995.4	0.0	3602995.4	13884.6	1537.5	12347.2	12884.7	1672.4	11212.3	40429.7	6468.8	33961.0
St.dev	2880.7	288.1	2592.6	83676.1	8827.7	75397.0	3846.0	769.2	3076.8	694540.0	37170.6	665448.5	2676.5	615.6	2060.9	2483.8	398.6	2085.6	7793.5	1269.0	6525.2
Minim	10028.7	942.9	9085.8	291308.3	0.0	291308.3	13389.5	1530.7	11858.8	2417957.0	0.0	2417957.0	9317.9	487.1	8830.8	8646.9	926.2	7720.7	27132.3	4116.8	23015.5
Maxim	19858.8	1925.9	17932.9	576848.2	26227.2	550620.9	26513.9	4155.6	22358.3	4788033.7	124205.1	4663828.7	18451.3	2587.8	15863.5	17122.6	2329.1	14793.5	53727.2	8596.4	45130.9
Skewness	0.00000	0.00000	0.00000	0.00000	0.63966	-0.10076	0.00000	0.00000	0.00000	0.00000	1.48298	-0.08376	0.00000	0.00000	0.00000	0.00000	-0.09428	0.01669	0.00000	-0.05432	0.00970
Mean	24905.5	2430.6	22475.0	722502.3	48075.3	674427.0	33208.6	5494.5	27714.1	5997012.2	305551.8	5691460.4	23110.3	3659.4	19450.9	21446.0	2999.0	18447.1	67293.4	10766.9	56526.4
Median	24873.1	2427.3	22445.8	722502.3	48075.3	674427.0	33208.6	5494.5	27714.1	5997012.2	305551.8	5691460.4	23110.3	3659.4	19450.9	21446.0	2999.0	18447.1	67293.4	10766.9	56526.4
St.dev	2927.3	292.7	2634.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	19958.1	1935.8	18022.3	579732.4	26659.9	553072.5	26646.4	4182.1	22464.3	4811973.9	127796.1	4684177.8	18543.6	2609.0	15934.6	17208.2	2342.3	14865.9	53995.9	8639.3	45356.5
Maxim	30025.2	2942.5	27082.7	865272.2	69490.8	795781.4	39770.8	6807.0	32963.8	7182050.6	483307.6	6698743.0	27677.0	4709.7	22967.3	25683.8	3655.6	22028.3	80590.9	12894.5	67696.3
Skewness	0.03684	0.03684	0.03684	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	35494.4	3489.4	32004.9	1010926.4	91339.0	919587.4	46465.5	8145.9	38319.6	8391029.1	664654.4	7726374.7	32335.9	5781.3	26554.7	30007.3	4325.5	25681.8	94157.0	15065.1	79091.9
Median	35494.4	3489.4	32004.9	1010926.4	91339.0	919587.4	46465.5	8145.9	38319.6	8391029.1	664654.4	7726374.7	32335.9	5781.3	26554.7	30007.3	4325.5	25681.8	94157.0	15065.1	79091.9
St.dev	3141.9	314.2	2827.8	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	30133.5	2953.4	27180.2	868156.5	69923.5	798233.0	39903.4	6833.5	33069.9	7205990.7	486898.6	6719092.1	27769.2	4730.9	23038.3	25769.5	3668.8	22100.6	80859.5	12937.5	67922.0
Maxim	40855.2	4025.5	36829.7	1153696.3	112754.4	1040941.9	53027.7	9458.3	43569.4	9576067.4	842410.1	8733657.3	36902.6	6831.6	30071.0	34245.1	4982.1	29263.0	107454.5	17192.7	90261.8
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	46324.4	4572.4	41751.9	1309988.1	147654.2	1162334.0	59722.5	10797.3	48925.2	10785046.0	1023756.9	9761289.1	41561.6	7903.2	33658.4	38568.6	5652.0	32916.6	121020.6	19363.3	101657.3
Median	46324.4	4572.4	41751.9	1309988.1	147654.2	1162334.0	59722.5	10797.3	48925.2	10785046.0	1023756.9	9761289.1	41561.6	7903.2	33658.4	38568.6	5652.0	32916.6	121020.6	19363.3	101657.3
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	40963.5	4036.4	36927.2	1156791.2	113445.5	1043345.7	53160.3	9484.9	43675.4	9600007.6	846001.1	8754006.5	36994.9	6852.8	30142.1	34330.7	4995.4	29335.4	107723.1	17235.7	90487.4
Maxim	51685.2	5108.5	46576.7	1463185.1	181862.8	1281322.3	66284.6	12109.7	54174.9	11970084.3	1201512.6	10768571.7	46128.3	8953.5	37174.8	42806.4	6308.6	36497.8	134318.1	21490.9	112827.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	57154.4	5655.4	51498.9	1619476.9	216762.5	1402714.4	72979.4	13448.7	59530.7	13179062.8	1382859.4	11796203.4	50787.3	10025.1	40762.2	47129.8	6978.5	40151.3	149590.1	23934.4	125655.7
Median	57154.4	5655.4	51498.9	1619476.9	216762.5	1402714.4	72979.4	13448.7	59530.7	13179062.8	1382859.4	11796203.4	50787.3	10025.1	40762.2	47129.8	6978.5	40151.3	149590.1	23934.4	125655.7
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	8773.6	1403.8	7369.8
Minim	51793.5	5119.4	46674.2	1466280.0	182553.9	1283726.1	66417.2	12136.2	54281.0	11994024.5	1205103.7	10788920.8	46220.6	8974.7	37245.8	42892.0	6321.9	36570.1	134620.5	21539.3	113081.2
Maxim	62515.2	6191.5	56323.7	1772673.8	250971.2	1521702.7	79541.6	14761.1	64780.5	14364101.2	1560615.2	12803486.0	55354.0	11075.4	44278.5	51367.7	7635.2	43732.5	164559.8	26329.6	138230.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 2e Descriptive statistics for pre-tax salary income, after-tax salary income and salary income tax

	BULGARIA			CZECH REPUBLIC			ESTONIA			HUNGARY			LATVIA			LITHUANIA			ROMANIA		
	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax	Pre-tax	Tax	After-tax
Statistics	S4: Employee having four or more dependent children																				
Mean	7159.6	656.0	6503.7	197078.0	0.0	197078.0	9115.6	390.3	8725.2	1739798.4	0.0	1739798.4	6599.7	0.0	6599.7	6191.6	320.9	5870.7	19694.3	2115.2	17579.1
Median	7159.6	656.0	6503.7	197078.0	0.0	197078.0	9115.6	306.3	8809.3	1739798.4	0.0	1739798.4	6599.7	0.0	6599.7	6191.6	300.2	5891.5	19694.3	2091.8	17602.5
St.dev	1623.3	162.3	1461.0	53537.1	0.0	53537.1	2427.2	382.8	2059.5	383431.4	0.0	383431.4	1539.0	0.0	1539.0	1388.8	264.5	1127.7	4201.9	1066.8	3136.5
Minim	4389.8	379.0	4010.9	105732.0	0.0	105732.0	4974.2	0.0	4974.2	1085580.0	0.0	1085580.0	3973.8	0.0	3973.8	3822.0	0.0	3822.0	12525.0	468.0	12057.0
Maxim	9929.4	932.9	8996.5	288424.1	0.0	288424.1	13256.9	1134.6	12122.3	2394016.9	0.0	2394016.9	9225.7	0.0	9225.7	8561.3	800.1	7761.1	26863.6	3971.5	22892.1
Skewness	0.00000	0.00000	0.00000	0.00000	na	0.00000	0.00000	0.47053	-0.12066	0.00000	na	0.00000	0.00000	na	0.00000	0.00000	0.23820	-0.07517	0.00000	0.08390	-0.03169
Mean	14943.7	1434.4	13509.4	434078.2	8081.4	425996.9	19951.7	2473.5	17478.1	3602995.4	0.0	3602995.4	13884.6	1054.5	12830.2	12884.7	1555.6	11329.1	40429.7	6450.9	33978.8
Median	14943.7	1434.4	13509.4	434078.2	4811.7	429266.5	19951.7	2473.5	17478.1	3602995.4	0.0	3602995.4	13884.6	1054.5	12830.2	12884.7	1564.4	11320.3	40429.7	6468.8	33961.0
St.dev	2880.7	288.1	2592.6	83676.1	8827.7	75397.0	3846.0	769.2	3076.8	694540.0	0.0	694540.0	2676.5	615.6	2060.9	2483.8	398.6	2085.6	7793.5	1276.6	6518.1
Minim	10028.7	942.9	9085.8	291308.3	0.0	291308.3	13389.5	1161.1	12228.4	2417957.0	0.0	2417957.0	9317.9	4.1	9313.8	8646.9	818.2	7828.7	27132.3	4042.0	23090.3
Maxim	19858.8	1925.9	17932.9	576848.2	26227.2	550620.9	26513.9	3786.0	22727.9	4788033.7	0.0	4788033.7	18451.3	2104.8	16346.5	17122.6	2221.1	14901.5	53727.2	8596.4	45130.9
Skewness	0.00000	0.00000	0.00000	0.00000	0.63966	-0.10076	0.00000	0.00000	0.00000	0.00000	na	0.00000	0.00000	0.00000	0.00000	0.00000	-0.09428	0.01669	0.00000	-0.07361	0.01288
Mean	24905.5	2430.6	22475.0	722502.3	48075.3	674427.0	33208.6	5124.9	28083.7	5997012.2	114769.7	5882242.6	23110.3	3176.4	19933.9	21446.0	2891.0	18555.1	67293.4	10766.9	56526.4
Median	24873.1	2427.3	22445.8	722502.3	48075.3	674427.0	33208.6	5124.9	28083.7	5997012.2	107551.8	5889460.4	23110.3	3176.4	19933.9	21446.0	2891.0	18555.1	67293.4	10766.9	56526.4
St.dev	2927.3	292.7	2634.6	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	94250.0	601391.2	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	19958.1	1935.8	18022.3	579732.4	26659.9	553072.5	26646.4	3812.5	22833.9	4811973.9	0.0	4811973.9	18543.6	2126.0	16417.6	17208.2	2234.3	14973.9	53995.9	8639.3	45356.5
Maxim	30025.2	2942.5	27082.7	865272.2	69490.8	795781.4	39770.8	6437.4	33333.4	7182050.6	285307.6	6896743.0	27677.0	4226.7	23450.3	25683.8	3547.6	22136.3	80590.9	12894.5	67696.3
Skewness	0.03684	0.03684	0.03684	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.23400	-0.04849	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	35494.4	3489.4	32004.9	1010926.4	91339.0	919587.4	46465.5	7776.3	38689.2	8391029.1	466654.4	7924374.7	32335.9	5298.3	27037.7	30007.3	4217.5	25789.8	94157.0	15065.1	79091.9
Median	35494.4	3489.4	32004.9	1010926.4	91339.0	919587.4	46465.5	7776.3	38689.2	8391029.1	466654.4	7924374.7	32335.9	5298.3	27037.7	30007.3	4217.5	25789.8	94157.0	15065.1	79091.9
St.dev	3141.9	314.2	2827.8	83676.1	12551.4	71124.7	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	30133.5	2953.4	27180.2	868156.5	69923.5	798233.0	39903.4	6463.9	33439.5	7205990.7	288898.6	6917092.1	27769.2	4247.9	23521.3	25769.5	3560.8	22208.6	80859.5	12937.5	67922.0
Maxim	40855.2	4025.5	36829.7	1153696.3	112754.4	1040941.9	53027.7	9088.7	43939.0	9576067.4	644410.1	8931657.3	36902.6	6348.6	30554.0	34245.1	4874.1	29371.0	107454.5	17192.7	90261.8
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	46324.4	4572.4	41751.9	1309988.1	147654.2	1162334.0	59722.5	10427.7	49294.8	10785046.0	825756.9	9959289.1	41561.6	7420.2	34141.4	38568.6	5544.0	33024.6	121020.6	19363.3	101657.3
Median	46324.4	4572.4	41751.9	1309988.1	147654.2	1162334.0	59722.5	10427.7	49294.8	10785046.0	825756.9	9959289.1	41561.6	7420.2	34141.4	38568.6	5544.0	33024.6	121020.6	19363.3	101657.3
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	7793.5	1247.0	6546.6
Minim	40963.5	4036.4	36927.2	1156791.2	113445.5	1043345.7	53160.3	9115.3	44045.0	9600007.6	648001.1	8952006.5	36994.9	6369.8	30625.1	34330.7	4887.4	29443.4	107723.1	17235.7	90487.4
Maxim	51685.2	5108.5	46576.7	1463185.1	181862.8	1281322.3	66284.6	11740.1	54544.5	11970084.3	1003512.6	10966571.7	46128.3	8470.5	37657.8	42806.4	6200.6	36605.8	134318.1	21490.9	112827.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean	57154.4	5655.4	51498.9	1619476.9	216762.5	1402714.4	72979.4	13079.1	59900.3	13179062.8	1184859.4	11994203.4	50787.3	9542.1	41245.2	47129.8	6870.5	40259.3	149590.1	23934.4	125655.7
Median	57154.4	5655.4	51498.9	1619476.9	216762.5	1402714.4	72979.4	13079.1	59900.3	13179062.8	1184859.4	11994203.4	50787.3	9542.1	41245.2	47129.8	6870.5	40259.3	149590.1	23934.4	125655.7
St.dev	3141.9	314.2	2827.8	89787.3	20049.4	69737.9	3846.0	769.2	3076.8	694540.0	104181.0	590359.0	2676.5	615.6	2060.9	2483.8	384.8	2098.9	8773.6	1403.8	7369.8
Minim	51793.5	5119.4	46674.2	1466280.0	182553.9	1283726.1	66417.2	11766.6	54650.6	11994024.5	1007103.7	10986920.8	46220.6	8491.7	37728.8	42892.0	6213.9	36678.1	134620.5	21539.3	113081.2
Maxim	62515.2	6191.5	56323.7	1772673.8	250971.2	1521702.7	79541.6	14391.5	65150.1	14364101.2	1362615.2	13001486.0	55354.0	10592.4	44761.5	51367.7	7527.2	43840.5	164559.8	26329.6	138230.2
Skewness	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Table 3 The effective tax rate

Group	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Romania
	S0: employee without dependent children						
G1	10.00	2.40	15.52	15.00	19.86	11.83	13.98
G2	10.00	9.28	17.96	15.00	21.51	15.49	16.00
G3	10.00	11.56	18.77	15.00	22.10	15.49	16.00
G4	10.00	12.54	19.12	15.00	22.36	15.49	16.00
G5	10.00	13.98	19.32	15.00	22.50	15.49	16.00
G6	10.00	15.57	19.44	15.00	22.59	15.49	16.00
	S1: employee with one dependent child						
G1	9.7	0.0	15.5	11.6	12.5	10.1	13.3
G2	9.9	6.2	18.0	13.3	18.0	14.7	16.0
G3	9.9	9.7	18.8	14.0	20.0	15.0	16.0
G4	9.9	11.2	19.1	14.3	20.9	15.1	16.0
G5	10.0	13.0	19.3	14.4	21.3	15.2	16.0
G6	10.0	14.7	19.4	14.5	21.6	15.3	16.0
	S2: employee with two dependent children						
G1	9.4	0.0	11.5	6.4	5.2	8.3	12.6
G2	9.7	2.3	16.1	10.8	14.6	13.8	16.0
G3	9.8	7.4	17.7	12.5	17.9	14.5	16.0
G4	9.9	9.5	18.3	13.2	19.4	14.8	16.0
G5	9.9	11.7	18.7	13.6	20.2	14.9	16.0
G6	9.9	13.7	18.9	13.9	20.7	15.0	16.0
	S3: employee with three dependent children						
G1	9.2	0.0	7.4	0.0	0.0	6.6	12.0
G2	9.6	1.1	14.3	0.0	11.1	13.0	16.0
G3	9.8	6.7	16.5	5.1	15.8	14.0	16.0
G4	9.8	9.0	17.5	7.9	17.9	14.4	16.0
G5	9.9	11.3	18.1	9.5	19.0	14.7	16.0
G6	9.9	13.4	18.4	10.5	19.7	14.8	16.0
	S4: employee with four or more dependent children						
G1	9.2	0.0	3.4	0.0	0.0	4.8	10.6
G2	9.6	1.1	12.4	0.0	7.6	12.1	16.0
G3	9.8	6.7	15.4	1.8	13.7	13.5	16.0
G4	9.8	9.0	16.7	5.6	16.4	14.1	16.0
G5	9.9	11.3	17.5	7.7	17.9	14.4	16.0
G6	9.9	13.4	17.9	9.0	18.8	14.6	16.0

Table 4 The Gini coefficient

	BULGARIA			CZECH REPUBLIC			ESTONIA			HUNGARY			LATVIA			LITHUANIA			ROMANIA		
	Pre-tax	After-tax	%	Pre-tax	After-tax	%	Pre-tax	After-tax	%	Pre-tax	After-tax	%	Pre-tax	After-tax	%	Pre-tax	After-tax	%	Pre-tax	After-tax	%
Group	S0: employees without dependent children																				
G1	15.02	15.02	0.00%	17.60	16.31	-7.33%	17.30	16.48	-4.74%	14.66	14.66	0.00%	15.40	14.87	-3.44%	14.88	13.53	-9.07%	14.26	13.47	-5.54%
G2	13.07	13.07	0.00%	13.07	12.37	-5.36%	13.07	12.80	-2.07%	13.07	13.07	0.00%	13.07	12.86	-1.61%	13.07	12.99	-0.61%	13.07	13.05	-0.15%
G3	8.75	8.75	0.00%	8.65	8.39	-3.01%	8.65	8.55	-1.16%	8.65	8.65	0.00%	8.65	8.58	-0.81%	8.65	8.65	0.00%	8.65	8.65	0.00%
G4	7.08	7.08	0.00%	6.75	6.62	-1.93%	6.75	6.70	-0.74%	6.75	6.75	0.00%	6.75	6.72	-0.44%	6.75	6.75	0.00%	6.75	6.75	0.00%
G5	5.90	5.90	0.00%	5.94	5.55	-6.57%	5.70	5.67	-0.53%	5.70	5.70	0.00%	5.70	5.68	-0.35%	5.70	5.70	0.00%	5.70	5.70	0.00%
G6	5.16	5.16	0.00%	5.18	4.93	-4.83%	5.03	5.01	-0.40%	5.03	5.03	0.00%	5.03	5.01	-0.40%	5.03	5.03	0.00%	5.37	5.37	0.00%
All	32.99	32.99	0.00%	32.78	31.32	-4.45%	32.39	31.98	-1.24%	32.13	32.13	0.00%	32.20	31.90	-0.93%	32.15	31.94	-0.65%	32.28	32.17	-0.34%
	S1: employees with one dependent child																				
G1	15.02	14.98	-0.27%	17.60	17.43	-0.97%	17.30	16.48	-4.74%	14.66	14.17	-3.34%	15.40	13.79	-10.45%	14.88	13.31	-10.55%	14.26	13.22	-7.29%
G2	13.07	13.06	-0.08%	13.07	12.03	-7.96%	13.07	12.80	-2.07%	13.07	12.86	-1.61%	13.07	12.40	-5.13%	13.07	12.89	-1.38%	13.07	13.05	-0.15%
G3	8.75	8.74	-0.11%	8.65	8.26	-4.51%	8.65	8.55	-1.16%	8.65	8.58	-0.81%	8.65	8.40	-2.89%	8.65	8.61	-0.46%	8.65	8.65	0.00%
G4	7.08	7.08	0.00%	6.75	6.55	-2.96%	6.75	6.70	-0.74%	6.75	6.71	-0.59%	6.75	6.63	-1.78%	6.75	6.73	-0.30%	6.75	6.75	0.00%
G5	5.90	5.89	-0.17%	5.94	5.51	-7.24%	5.70	5.67	-0.53%	5.70	5.68	-0.35%	5.70	5.62	-1.40%	5.70	5.69	-0.18%	5.70	5.70	0.00%
G6	5.16	5.16	0.00%	5.18	4.90	-5.41%	5.03	5.01	-0.40%	5.03	5.01	-0.40%	5.03	4.97	-1.19%	5.03	5.02	-0.20%	5.37	5.37	0.00%
All	32.99	32.96	-0.09%	32.78	30.99	-5.46%	32.39	31.98	-1.24%	32.13	31.82	-0.96%	32.20	31.21	-3.07%	32.15	31.79	-1.12%	32.28	32.13	-0.46%
	S2: employees with two dependent children																				
G1	15.02	14.94	-0.53%	17.60	17.60	0.00%	17.30	15.82	-8.55%	14.66	13.49	-7.98%	15.40	13.33	-13.44%	14.88	13.09	-12.03%	14.26	12.97	-9.05%
G2	13.07	13.04	-0.23%	13.07	11.98	-8.34%	13.07	12.56	-3.90%	13.07	12.56	-3.90%	13.07	11.98	-8.34%	13.07	12.78	-2.22%	13.07	13.04	-0.23%
G3	8.75	8.74	-0.11%	8.65	8.10	-6.36%	8.65	8.46	-2.20%	8.65	8.46	-2.20%	8.65	8.24	-4.74%	8.65	8.57	-0.92%	8.65	8.65	0.00%
G4	7.08	7.08	0.00%	6.75	6.47	-4.15%	6.75	6.66	-1.33%	6.75	6.66	-1.33%	6.75	6.54	-3.11%	6.75	6.71	-0.59%	6.75	6.75	0.00%
G5	5.90	5.89	-0.17%	5.94	5.46	-8.08%	5.70	5.64	-1.05%	5.70	5.64	-1.05%	5.70	5.57	-2.28%	5.70	5.67	-0.53%	5.70	5.70	0.00%
G6	5.16	5.16	0.00%	5.18	4.87	-5.98%	5.03	4.99	-0.80%	5.03	4.99	-0.80%	5.03	4.94	-1.79%	5.03	5.01	-0.40%	5.37	5.37	0.00%
All	32.99	32.94	-0.15%	32.78	30.76	-6.16%	32.39	31.63	-2.32%	32.13	31.37	-2.37%	32.20	30.59	-5.00%	32.15	31.63	-1.62%	32.28	32.09	-0.59%
	S3: employees with three dependent children																				
G1	15.02	14.90	-0.80%	17.60	17.60	0.00%	17.30	15.31	-11.50%	14.66	14.66	0.00%	15.40	14.54	-5.58%	14.88	12.97	-12.84%	14.26	12.73	-10.73%
G2	13.07	13.02	-0.38%	13.07	12.16	-6.96%	13.07	12.33	-5.66%	13.07	12.56	-3.90%	13.07	11.59	-11.32%	13.07	12.68	-2.98%	13.07	13.03	-0.31%
G3	8.75	8.73	-0.23%	8.65	8.06	-6.82%	8.65	8.38	-3.12%	8.65	7.96	-7.98%	8.65	8.09	-6.47%	8.65	8.54	-1.27%	8.65	8.65	0.00%
G4	7.08	7.08	0.00%	6.75	6.44	-4.59%	6.75	6.61	-2.07%	6.75	6.39	-5.33%	6.75	6.46	-4.30%	6.75	6.69	-0.89%	6.75	6.75	0.00%
G5	5.90	5.89	-0.17%	5.94	5.45	-8.25%	5.70	5.61	-1.58%	5.70	5.47	-4.04%	5.70	5.52	-3.16%	5.70	5.66	-0.70%	5.70	5.70	0.00%
G6	5.16	5.15	-0.19%	5.18	4.86	-6.18%	5.03	4.97	-1.19%	5.03	4.99	-0.80%	5.03	4.90	-2.58%	5.03	5.00	-0.60%	5.37	5.37	0.00%
All	32.99	32.92	-0.21%	32.78	30.72	-6.28%	32.39	31.29	-3.37%	32.13	30.45	-2.37%	32.20	30.13	-6.43%	32.15	31.49	-2.05%	32.28	32.06	-0.68%
	S4: employees with four and more dependent children																				
G1	15.02	14.90	-0.80%	17.60	17.60	0.00%	17.30	15.54	-10.17%	14.66	14.66	0.00%	15.40	14.54	-5.58%	14.88	13.03	-12.43%	14.26	12.25	-14.10%
G2	13.07	13.02	-0.38%	13.07	12.16	-6.96%	13.07	12.11	-7.35%	13.07	12.56	-3.90%	13.07	11.23	-14.08%	13.07	12.57	-3.83%	13.07	13.02	-0.38%
G3	8.75	8.73	-0.23%	8.65	8.06	-6.82%	8.65	8.29	-4.16%	8.65	7.87	-9.02%	8.65	7.94	-8.21%	8.65	8.50	-1.73%	8.65	8.65	0.00%
G4	7.08	7.08	0.00%	6.75	6.44	-4.59%	6.75	6.57	-2.67%	6.75	6.28	-6.96%	6.75	6.38	-5.48%	6.75	6.67	-1.19%	6.75	6.75	0.00%
G5	5.90	5.89	-0.17%	5.94	5.45	-8.25%	5.70	5.59	-1.93%	5.70	5.41	-5.09%	5.70	5.47	-4.04%	5.70	5.65	-0.88%	5.70	5.70	0.00%
G6	5.16	5.15	-0.19%	5.18	4.86	-6.18%	5.03	4.95	-1.59%	5.03	4.83	-3.98%	5.03	4.87	-3.18%	5.03	4.99	-0.80%	5.37	5.37	0.00%
All	32.99	32.92	-0.21%	32.78	30.72	-6.28%	32.39	31.00	-4.26%	32.13	30.49	-5.10%	32.20	29.85	-7.30%	32.15	31.35	-2.49%	32.28	31.98	-0.93%

Table 5 Income redistribution vs. tax equity

	Bulgaria		Czech Republic		Estonia		Hungary		Latvia		Lithuania		Romania	
	Redistribution	Tax equity	Redistribution	Tax equity	Redistribution	Tax equity	Redistribution	Tax equity	Redistribution	Tax equity	Redistribution	Tax equity	Redistribution	Tax equity
Groups	**S0: employees without dependent children**													
G1	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
G2	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
G3	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes
G4	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes
G5	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes
G6	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes
	S1: employees with one dependent child													
G1	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
G2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
G3	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G6	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	S2: employees with two dependent children													
G1	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No
G2	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
G3	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G4	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G6	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	S3: employees with three dependent children													
G1	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	No
G2	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No
G3	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G4	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G6	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	S4: employees with four and more dependent children													
G1	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No
G2	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
G3	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
G4	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
G6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Total no.	**18**	**3**	**27**	**5**	**30**	**2**	**22**	**2**	**30**	**2**	**26**	**7**	**10**	**10**
Ratio		**0.17**		**0.19**		**0.07**		**0.09**		**0.07**		**0.27**		**1.00**

Table 6 Breakdown of tax revenue by country in 2016 (% of total)

	D.2 Taxes on production and imports	D.21 Taxes on products	D.211 Value added type taxes	D.212 Taxes and duties on imports excluding VAT	D.214 Taxes on products, except VAT and import taxes	D.29 Other taxes on production	D.5 Current taxes on income, wealth etc	D.51 Taxes on income	D.51a+c1 of which, taxes on individual or household income incl. holding gains	D.51b+c2 of which, taxes on the income or profits of corporations incl. holding gains	D.59 Other current taxes	D.91 Capital taxes	D.61 Net social contributions	D.611 Employers' actual social contributions	D.613 Households' actual social contributions	D.612 Imputed social contributions	D.614 Households' social contribution supplements	D.619C Households' social contribution supplements	D.995 Capital transfers from gen. government to rel. sectors representing taxes assessed but unlikely to be collected	Total receipts from taxes and social contributions (including imputed social contributions) after deduction of amounts assessed but unlikely to be collected
EU-28	33.9	28.0	17.5	1.1	9.4	5.8	32.4	30.2	23.4	6.6	2.3	0.7	33.2	17.4	13.7	0.0	0.0	0.0	0.2	100.0
EA-19	31.9	26.5	16.5	1.3	8.7	5.4	30.5	28.8	22.1	6.3	1.7	0.8	37.1	19.1	15.3	2.7	0.0	0.0	0.3	100.0
BE	28.9	24.0	14.5	1.4	8.1	4.9	34.9	33.9	26.0	7.3	1.0	1.7	34.6	17.7	11.7	5.1	0.0	0.0	0.0	100.0
BG	53.6	50.7	31.7	0.7	18.4	2.9	18.5	17.9	10.5	7.3	0.6	0.9	27.0	16.3	10.8	0.0	0.0	0.0	0.0	100.0
CZ	35.9	34.4	21.3	4.9	8.2	1.5	21.8	21.1	11.0	10.1	0.7	0.0	42.4	27.1	15.2	0.1	0.0	0.0	0.0	100.0
DK	34.9	30.1	20.2	0.3	9.6	4.8	63.4	60.8	55.0	5.8	2.7	0.4	2.0	0.1	1.5	0.4	0.0	0.0	0.8	100.0
DE	26.9	25.2	17.2	2.1	5.9	1.8	31.3	30.1	22.7	6.6	1.2	0.6	41.3	16.3	22.1	2.8	0.0	0.0	0.0	100.0
EE	43.9	41.6	27.0	14.1	0.5	2.3	22.2	22.2	17.2	5.0	0.0	0.0	33.9	31.5	1.7	0.7	0.0	0.0	0.0	100.0
IE	36.5	32.2	19.6	6.0	6.6	4.3	44.4	42.8	31.5	11.4	1.6	0.6	18.4	10.2	6.3	1.9	0.0	0.0	0.0	100.0
EL	41.2	32.9	19.6	0.5	12.8	8.3	24.6	21.7	14.0	6.0	2.9	0.2	34.0	10.5	15.8	7.6	0.0	0.0	0.0	100.0
ES	34.6	29.2	18.9	0.5	9.7	5.4	29.0	28.0	21.3	6.7	1.1	1.7	35.7	24.1	9.6	2.0	0.0	0.0	1.0	100.0
FR	33.9	24.2	14.5	0.2	9.4	9.7	26.2	23.9	18.3	5.5	2.3	1.2	39.5	23.6	11.8	4.0	0.0	0.0	0.7	100.0
HR	51.7	48.3	34.3	0.3	13.7	3.4	17.4	15.8	9.7	5.9	1.5	0.0	30.9	16.4	14.5		0.0	0.0	0.0	100.0
IT	34.1	27.5	14.3	0.3	12.9	6.6	34.4	32.9	27.9	4.9	1.5	0.7	30.8	20.1	10.1	0.5	0.0	0.0	0.0	100.0
CY	45.8	39.2	27.3	0.7	11.2	6.5	28.8	26.9	8.6	17.2	2.0	0.0	25.4	17.2	8.1	0.0	0.0	0.0	0.0	100.0
LV	45.9	41.7	25.9	0.6	15.3	4.3	26.7	25.6	20.2	5.4	1.1	0.0	27.3	19.3	6.9	1.1	0.0	0.0	0.0	100.0
LT	39.8	37.9	25.9	0.9	11.0	1.9	18.8	18.7	13.3	5.4	0.2	0.0	41.5	27.4	13.1	1.1	0.0	0.0	0.1	100.0
LU	30.6	25.3	16.3	6.5	2.4	5.4	38.2	35.5	23.7	11.7	2.7	0.4	30.8	11.6	16.1	3.2	0.0	0.0	0.0	100.0
HU	46.5	42.0	23.6	0.4	17.9	4.5	18.9	18.3	12.3	5.6	0.6	0.1	34.5	19.5	14.9	0.1	0.0	0.0	0.0	100.0
MT	39.0	37.1	21.8	0.5	14.8	1.8	41.4	39.9	20.3	19.4	1.6	0.5	19.1	7.5	8.7	2.9	0.0	0.0	0.0	100.0
NL	30.7	27.2	17.6	4.4	5.2	3.5	29.7	27.9	18.4	8.4	2.7	0.7	38.9	13.2	24.5	1.1	0.0	0.0	0.0	100.0
AT	34.0	25.9	18.0	0.3	7.6	8.1	30.3	28.3	22.0	5.7	2.0	0.0	35.7	18.0	16.5	1.2	0.0	0.0	0.0	100.0
PL	39.4	33.8	20.5	1.7	11.6	5.6	20.7	19.5	14.1	5.4	1.3	0.0	40.2	14.5	22.9	2.8	0.0	0.0	0.4	100.0
PT	40.5	36.0	23.1	1.9	11.1	4.4	27.9	26.8	18.5	8.3	1.1	0.0	31.6	14.2	10.6	6.8	0.0	0.0	0.0	100.0
RO	43.8	41.0	24.9	1.4	14.7	2.9	24.9	23.3	14.1	8.6	1.6	0.0	31.3	18.9	12.0	0.4	0.0	0.0	0.0	100.0
SI	39.9	36.5	22.2	0.4	13.9	3.4	20.1	18.4	14.0	4.3	1.7	0.1	40.0	15.0	24.1	0.8	0.0	0.0	0.0	100.0
SK	33.2	30.2	20.6	0.5	9.1	3.1	22.6	21.6	10.2	10.7	1.0	0.0	44.1	24.6	18.9	0.7	0.0	0.0	0.0	100.0
FI	32.9	32.4	20.6	0.2	11.6	0.5	37.3	34.6	29.5	5.0	2.7	0.5	29.3	19.7	9.6	0.0	0.0	0.0	0.0	100.0
SE	50.5	27.1	20.6	0.3	6.1	23.5	42.0	41.5	35.1	6.3	0.6	0.0	7.4	6.9	0.2	0.0	0.4	0.0	0.0	100.0
UK	37.1	32.4	19.4	0.5	12.5	4.7	40.3	34.0	26.0	8.0	6.2	0.7	22.0	13.1	8.7	0.2	0.0	0.0	0.0	100.0
IS	27.3	22.1	16.3	0.4	5.4	5.2	35.2	34.2	27.4	4.9	1.0	30.7	6.8	6.6	0.2	0.0	0.0	0.0	0.0	100.0
NO	32.3	30.1	22.2	0.3	7.6	2.2	40.4	38.5	27.6	10.7	1.9	0.0	27.3	15.9	11.3	0.0	0.0	0.0	0.0	100.0
CH	21.5	19.2	12.2	3.4	3.7	2.3	53.9	46.8	31.4	11.3	7.0	0.6	24.5	11.3	13.0	0.2	0.0	0.0	0.6	100.0
RS	51.6	47.6	27.3	6.4	13.8	4.0	16.4	15.9	9.4	6.3	0.5	0.0	32.0	14.5	17.5		0.0	0.0	0.0	100.0

Source: Eurostat