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Measurement of Labour Taxation

Jan Tecl[*]

Abstract:

Measurement of taxation of individuals is currently an interesting topic, as there is a number of people who can perform their job from any place in the world and their net income is one of the most important criteria on the basis of which their final decision is being made. Level of labour taxation is also important for international companies, which consider the location of their business and one of their important criteria is labour taxation. Provided the companies want to pay their employees equal net wage in each country, high labour taxation increases their costs. This also means that the labour taxation is related to the country's competitiveness.

However, there is not just one way of measurement of labour taxation, because one can distinguish between nominal, average, effective and marginal tax rates on labour and there is also the tax wedge which could measure the labour taxation. The aim of this paper is to re-calculate numbers for the implicit tax rate (tax wedge) on labour in the EU countries for the newer period based on the Eurostat data according to the Mendoza et al. (1994) and Wolff (2005) methodology. These values will be in turn compared with data on the tax wedge measured by the Eurostat using their own methodology. One could expect that each methodology could give slightly different results, but these results should be similar. If there are differences between these values, the decision of individuals could be incorrectly affected by different values of labour taxation.

Key words: Labour taxation; Implicit tax rate; Eurostat.

JEL classification: H24.

1 Measurement of Labour Taxation

The aim of this paper is to show differences among various possible ways of measurement of the implicit tax rate (ITR), using the sample of EU countries. Partial aim is to re-calculate the average ETR on labour income using the methodology of Mendoza et al. (1994) and Wolff (2005) based on the data for the period 2000–2015. As the principles of ITR calculation are the same, the results could differ due to the input data and the source of these input data.

Differences in results could affect the decision process of individuals, who consider the change of the location of their employment activity. This could be the case of a group people called digital nomads, who can do their activity all over the world (usually not as employees, but as independent persons – self-employed).

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Different results of ITR could also affect results of other related papers and studies which as their source data use values of implicit tax rates (e.g. Kotlán et al. (2011), Tecl (2017), Pomerleau (2017)).

There are many ways of how to measure and afterwards compare the labour taxation between countries. There are also many tax rates which are outcomes of these different measurement (e.g. de Haan et al., 2003).

First of all, it is important to establish what is understood as a tax. There are basically two views on payments which could be considered as taxes. These two vies are legal and economic points of view (Vančurová and Láchová, 2016). For purposes of this paper, the economic point of view will be used, so not only personal income tax, but also social security contributions, health insurance contributions and other compulsory payments will be considered as means of labour taxation. The economic point of view provides us with better and more comparable information, as the payments should be considered based on their economic purpose and not only by legal classification.

There are two main ways of how to measure the amount of taxation related to labour and employment. It is possible to measure it by the tax rate (tax burden) and the tax wedge (OECD, 2016). *Tax rate is measured as the sum of personal income tax and employee social security contributions expressed as a percentage of gross wage earnings* (OECD, 2016). This measurement takes into account only the perspective of an employee and it does not take into account the employer.

For this measurement, only the payments made by an employee or on his or her account are calculated. On the other hand, there are also payments of employer which should be also considered for the calculation of the total level of taxation. This is the case of the tax wedge, which is calculated as follows: *The sum of personal income tax, employee and employer social security contributions plus any payroll tax less cash transfers expressed as a percentage of labour costs* (OECD, 2016). The tax wedge compared to the tax rate also considers payments made by the employer as a part of his costs. This calculation is from the employer's point of view better as it includes all the costs and payments since it does not matter who pays these payments – whether an employee or its employer. The tax wedge gives us better information on labour taxation, because it does not matter who pays the tax, but it more important to compare the total costs (payments) of the employer and the net income of its employee.

Tax burden and tax wedge are measured by many established organizations, governments and academics and these measurements differ based on the source of used data and for which person they are calculated (whether different in e.g. the number of children, entitled allowances, the type of household, etc.).

A tax rate could be measured in many ways – nominal (statutory), effective or marginal tax rate (Vančurová and Láchová, 2016). Nominal (statutory) tax rate is

stated in the applicable tax act and it is usually the first tax rate, for which potential investors or other subjects look when they compare countries to each other, using e.g. the publication Taxing Wages, issued by OECD, respectively, world competitiveness ranks issued by IMD or WEF [1]. Using the tax rate could be mainly because of the simplicity of its measurement/tracing (Wolff, 2005).

Effective tax rate (ETR) is calculated on current data (for the whole economy or for the specific tax payer). This measurement is also known as tax burden. It measures the income before and after taxation. Effective tax rate is influenced by many factors which are specific for each person. There cannot be stated effective tax rate for each individual person, but it can be stated for a model person (under defined conditions).

Marginal tax rate states how much is taxed the last unit of income. Usually, the marginal tax rate is the highest one from these types of tax rates (Vančurová and Láchová, 2016).

Eurostat measures *the implicit tax rate on employed labour as the sum of all direct and indirect taxes and employees' and employers' social contributions levied on employed labour income divided by the total compensation of employees working in the economic territory increased by taxes on wage bill and payroll. The implicit tax rate on labour should be seen as a summary measure that approximates an average effective tax burden on labour income in the economy.* Based on this definition, the implicit tax rate (ITR) is comparable with the tax wedge.

All these measurements could be divided in some groups. There are hypothetical and real indexes and microeconomic and macroeconomic indexes (Kubátová, 2011). Using the microeconomic approach, the taxation is computed for one specific person (or for some model person). On the other hands, the macroeconomic view computes the taxation on real data from economy and it is not possible to differentiate among categories or types of persons (as it is hard to get more detailed data).

As mentioned above, tax rates on labour are used for comparing countries with each other and to measure their competitiveness. Taxation could be also one of the reasons for the particular location of an investment. For employees, it is not easy to relocate (as they are usually employed by one employer with a specific seat of business). Nevertheless, presently the comparison could be of importance for the so called “digital nomads” who could choose their location. Hansson and

[1] IMD, 2017. The World Competitiveness Yearbook, Available from: <http://www.imd.org/wcc/wcy-world-competitiveness-yearbook>.
World Economic Forum, 2015. Global Competitiveness Report, Available from: <http://reports.weforum.org/global-competitiveness-report-2015-2016>.
Tax Foundation, 2017. International Tax Competitiveness Index, Available from: <http://taxfoundation.org/search/node/competitiveness>.

Olofsdotter (2014) discuss in their paper importance of taxation of high skilled people and their motivation to choose their location.

Based on the data, the highest top statutory personal income tax rates are in Nordic countries (Denmark, Sweden, and Finland) and Belgium. One should also consider the social security contributions (in nominal rate) paid by an employer and its employee. These payments are the highest in France, Austria, Belgium, the Czech Republic and Slovakia. One could assume that these countries will also have a high tax wedge.

1.1 Microeconomic measurement

Microeconomic measurement is focused on a taxpayer in a specified situation for whom is measured his or her tax rate. Many researches and studies use as a source of data on labour taxation data from the study Taxing Wages, provided by OECD. There are also other measurements which usually criticise the methodology adopted by OECD and try to find their own way (Cok et al., 2013; Urban, 2016).

The study Taxing Wages is issued annually by OECD for 34 countries which are part of the OECD. The study provides information on the personal income tax and social security contributions paid by employees, social security contributions and payroll taxes paid by their employers and cash benefits received by families. It does not take into the account compulsory and voluntary payments to other funds (Urban, 2016).

It is not possible to measure the amount of taxation for each individual tax payer in the economy, so the study focuses on eight different types of families (households). These groups differ in the amount of income and the number of children (see the methodology in Taxing Wages, OECD, 2016). The amount of income is not stated in absolute terms. Instead, it is stated as relative amount of average wage in the economy. Households have their income only from employment and for the calculation of this average, their income do not covered all components of the classification of activity (ISIC) (e.g. agriculture, education, public administration).

Calculation of the average wage is usually based on data from statistical offices and these earnings are calculated for a worker, who is neither ill nor unemployed. These data are also limited due to the fact that data for the current year are not available, so calculated are adjusted data from the previous year. As all these data are available in local currencies, they are recalculated into US dollars for the sake of mutual comparison. In the study Taxing Wages, there are used two terms related to the wage taxation– tax wedge and personal average tax rate. For the definition of the tax wedge by OECD, see above. The personal average tax rate is calculated as follows: *personal income tax and employee social security*

contributions net of cash benefits expressed as a percentage of gross wage earnings (OECD, 2016).

1.2 Macroeconomic measurement

At the macroeconomic level, (Wolff, 2005) differentiates four different types of measurements of the (labour) taxation. It could be measured as a statutory tax rate, tax quota (ratio between collected amount of tax and GDP), ETRs according to (Mendoza et al., 1994) and effective ex-ante tax rates according to (Devereux and Griffith, 2003).

Forward looking measurement is relevant for an investor of individual who plans to locate his or her investment. However, its calculation is difficult. On the other hand, ex-post analysis calculates the tax rate on real data with a time-lag. Both of these measurements give us better view on the ETR than statutory tax rates, because they calculate with tax exemptions and other tax instruments which affect the nominal tax rate.

The concept of Devereux and Griffith (2003) calculates with many variables and some assumptions have also to be made (regarding future changes of tax system). Therefore it is hard to calculate, but it gives us more precise data. In the past, ETRs for the old EU member states and new member states were calculated separately. (Wolff, 2005) computed the ETR on capital, labour and consumption for all the 25 EU countries following the methodology of (Mendoza et al., 1994).

2 Data and Methodology

The analysis will be done for taxation of income from employment (calculation of the tax wedge) in the EU member states for the period 2000–2015 as an ex-post macroeconomic analysis. The source of data used in this paper is Eurostat database and the units are measured in EUR. These data will be compared with the data measured also by the Eurostat for implicit tax rate on labour. Data for ITR was available for the period from 2000 to 2012, so only this period was compared with the data computed by the methodology of this paper. Results could be also compared with the data recorded by OECD, but the data from OECD are available only for model workers (who differ in the amount of wage and not in an economy as average).

From the Eurostat database will be used data for the effective tax rate and labour cost index by NACE (dataset lc_lci_r2_a).

Data for the variables D1 and D11 were available only for years 2000, 2004, 2008 and 2012. For computing of values for other years, variables from the dataset lc_lci_r2_a were used in an adjusted form since the increase of variables D1 and D11 between the years 2008 and 2012 do not correspond with the increase in labour cost indexes.

Tab. 1 Overview of variables

Code of variable	Description of variable
B2n	Net operating surplus in the economy
D1	Total labour costs
D11	Wages and salaries
D29	Other taxes on production
D29c	Other taxes on production, taxes on the total wage bill and payroll taxes
D51A + D51C1	Taxes on individual or household income including holding gains
D51B + D51C2	Taxes on the income or profits of corporations including holding gains
D611	Employers' actual social contributions

Source: Eurostat.

There are also some countries with missing observations for some of the years, so for this combination of year and country the analysis will be not done.

For computing the average ETR on labour income, the methodology of Wolff (2005) is used. Wolff (2005) based his paper on the methodology used by (Mendoza et al., 1994). Wolff (2005) computed the average ETR on labour income for the period from 1991 to 2003.

Calculation of the tax wedge as stated below is based on certain assumptions. It is assumed that the household income is taxed by the same rate, so the tax rates do not differ for different kinds of income. The result of this calculation is an average of values, so it is not valid for each household in the given economy.

Based on the methodology of Wolff (2005), firstly the intermediate tax rate has to be computed. The equation (1) calculates the tax rate by which households' incomes are taxed on average. This equation is based on the assumption stated above (all incomes are taxed by the same rate).

$$t_h = \frac{T_h}{W+OSP} = \frac{D51A+D51C1}{PITB}. \quad (1)$$

Where t_h stands for the households' average tax rate; T_h means the tax payment by a household on income, profits and capital gains (from Eurostat database is used the variable D51A+D51C1– taxes on income, profits and capital gains of individuals, W denotes wages and salaries and OSP are operating surpluses of private unincorporated enterprises and entrepreneurial incomes (from the Eurostat database will be used for the sum of variables W and OSP the variable PITB – personal income tax base (pre-tax household income).

$$PITB = D1 + B2n - D611 - D51b - D51C2 - D29. \quad (2)$$

Where D1 is a compensation of employees, total economy; B2n means net operating surplus in the economy; D611 is used for actual social contributions received, general government; B51b and D51C2 expresses taxes on income, profits and capital gains of corporations andD29 represents other taxes on production.

The average households' tax rate is used for computing the effective labour tax rate.

$$t_i = \frac{t_h * W + SSC^{tot} + T_{pw}}{W + SSC^{er}} = \frac{t_h * D11 + D611 + D29C}{D11 + D6111}. \quad (3)$$

Where t_i is implicit (average) tax rate on labour income; SSC^{ee} means the total social security contribution to social security (from Eurostat is used the variable D11 – wages and salaries), T_{pw} are taxes on payroll and workforce (from the Eurostat database it is D611) and SSC^{er} is used for employer's contribution to social security (from the Eurostat database the variable D6111 is used for employers' actual social contributions).

3 Results and Discussion

Based on the equations (1), (2) and (3), results for the years 2000, 2004, 2008 and 2012 were calculated. There were found some inconsistencies of data for some countries which cause non-interpretable results in some cases.

As stated above, the data for some years (2001–2003, 2005–2007, 2009–2011, and 2013–2015) were missing and there was a need to calculate them. For this purpose was used the data set lc_lci_r2_a which contains year-on-year changes. Afterwards, the same equations (1), (2) and (3) were used for the calculation of data for that missing years.

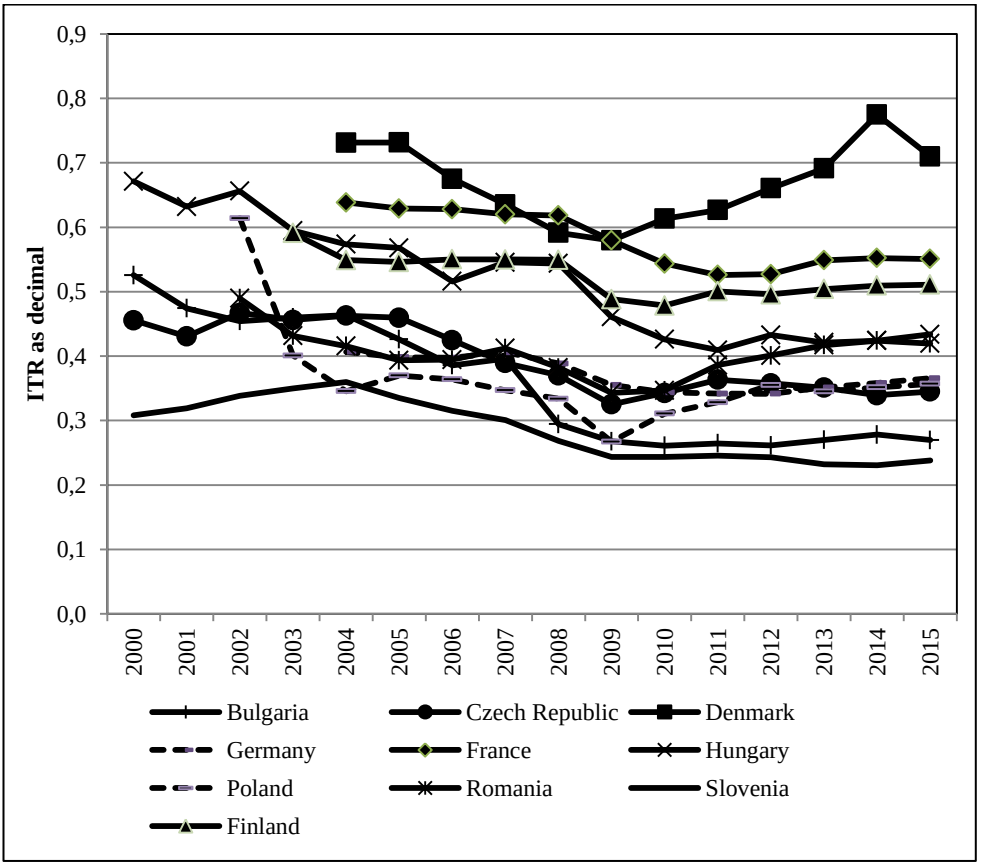
There were no data for Belgium, Italy, Luxemburg, Malta, Austria and Sweden, so these data are not part of the analysis. First of all, the households' average tax rate was calculated for all countries. This is not a result of the tax wedge since part of the employer's payments is missing. The results show that in Finland, the United Kingdom and France is the value of households' average tax rate similar to the value of the tax wedge. Note that this is not the result of this paper, since there might be many factors which cause the same values. Otherwise it could mean that an employer do not pay any social security payments nor other payroll taxes and that households in the economy do not enter any entrepreneur activity or the activity is effectively taxed by the same tax rate as an income from employment.

The data show that the households' average tax rate above 40% applied for some years in Denmark, Finland, France, Greece, Hungary Ireland and Spain, However, the results for Denmark show that the households' average tax rate was around

60%. These results are non-interpretable and may be caused by inconsistency in data.

Afterwards, based on the paper's methodology, the implicit tax rate on labour income was calculated.

Fig. 1 Implicit tax rate on labour



Source: Eurostat data, author's computation, based on the methodology Mendoza et al., (1994) and Wolff (2005).

Figure (1) shows some of the results of ITR for the EU countries. There are plotted only selected countries – with high values / high decrease in values. The highest ITR has Denmark, followed by France and Finland. This result could be expected, as the Nordic countries have high individual income tax rates and France has high social security payments.

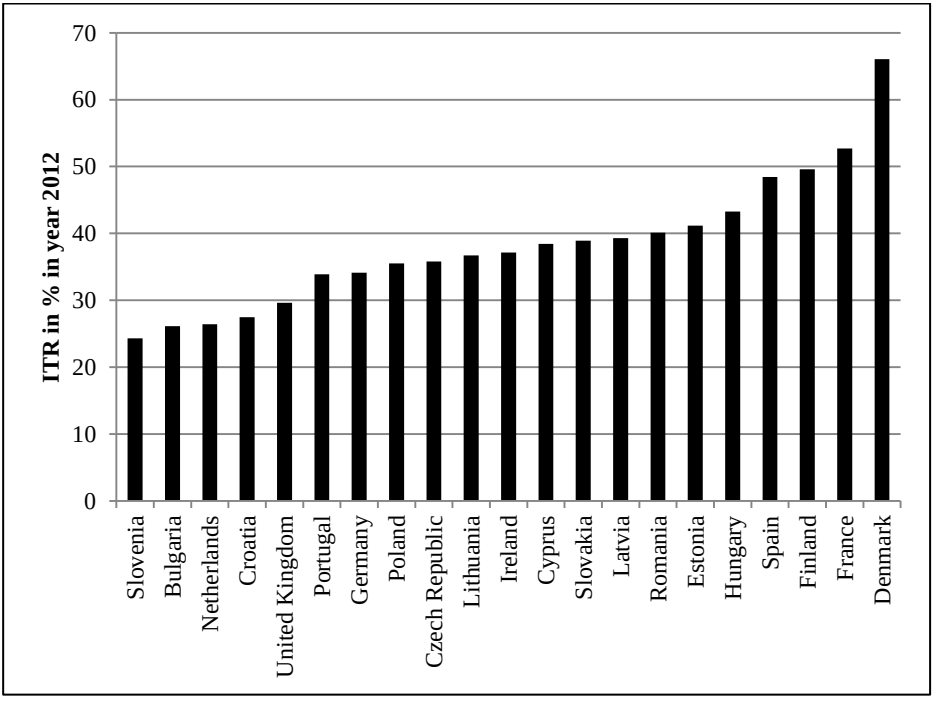
On the opposite site, the countries with the lowest ITR are Slovenia, Netherlands and Bulgaria.

Some of the countries recorded during the period a slight decrease in the value of ITR – this is the case of e.g. Bulgaria, Hungary, France and Lithuania. For some of the countries there is no trend and the values of ITR are stable during the period – examples could be the Netherlands, Romania and Finland.

The results show high changes of ITR for some countries for only a short period. These changes in ITR could be caused by inconsistency in data in the dataset.

Based on the results for the year 2012 as there are available data for all variables and there was no need for computing the missing data (see Figure 2), the highest ITR on labour in Europe is in the Nordic countries – on the first place is Denmark, followed by France (which itself is not a Nordic country) and the following country is Finland. These rates are generally over 50%. Also Spain has ITR on labour near 50%.

Fig. 2 Implicit tax rate on labour in 2012



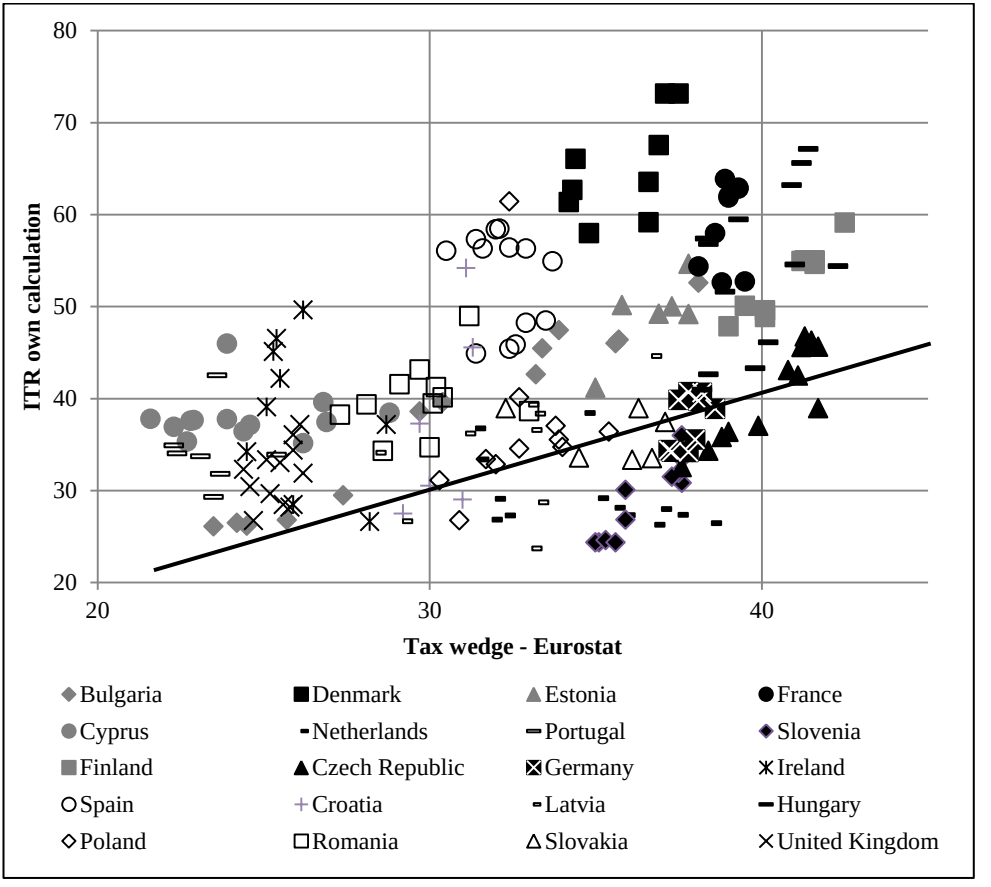
Source: Eurostat data, author's computation, based on the methodology Mendoza et al., (1994) and Wolff (2005).

On the opposite side of the spectre is Slovenia with the lowest ITR on labour. Also Netherlands, United Kingdom, Bulgaria and Croatia have low ITR. These countries have ITR below 30%.

Nine countries have the value of ITR between 33% and 40%. These countries are usually new member states of the EU from 2004 and 2006 – Cyprus, Czech Republic, Latvia, Lithuania, Poland, Romania and Slovakia and also some of the old EU member states – Germany, Ireland and Portugal. The new EU member states with low ITR could be expected as the countries competing with low costs of labour.

After computation of the ITR based on the Eurostat data, the results were compared with the tax wedge computed directly by the Eurostat.

Fig. 3 Comparison of computed data and Eurostat data



Source: Eurostat data, author's computation, based on the methodology Mendoza et al., (1994) and Wolff (2005).

In Figure 3 are plotted combinations of tax rates from both sources. If the result is the same, points should be located on the line which shows points with the same ITR results from both sources.

Generally, the definition and computing is quite similar, but the results differ for some of the countries. There are some countries which are near the equal line –for example Bulgaria, the Czech Republic, Germany, Poland and Slovakia.

ITR on labour computed based on the methodology of this paper (i.e. based on the methodology of (Mendoza et al., 1994) and (Wolff, 2005)) is for almost of the rest countries higher than the tax wedge measured by the Eurostat. The exceptions are the Netherlands and Slovenia. These countries have computed values lower than the data recorded by Eurostat.

There are some outlier observations. This is the case of Ireland, which has, based on the Eurostat, a particularly low tax wedge (between 24 and 29%).

On the other hand, there are also countries which are far from the equal line. This is the case of Denmark, because its ITR computed by the equation (3) is much higher than the ITR measured by Eurostat. The same is the case of Finland, Hungary, Lithuania and Spain. Differences between the computed ITR and ITR from Eurostat should be analysed more deeply for countries which amounts differ. These differences are usually stable and non-random. A problem could be found in the calculation of ETR based on the equation (3), because one could assumed that the effective tax rate in the amount of nearly 70% is not possible under the present situation of tax competitions between countries.

Figure (3) also shows that both methodologies are similar and there is no incorrect interpretation of data as the countries which have a high tax wedge based on the Eurostat data are also countries with high ITR.

Because of these differences, the OECD data were also used for comparison. OECD computes the tax wedge for a model tax payer, who differs in the number of children and the amount of wage. Because of this, there are eight model tax payers. For the purpose of this article, the tax payer with 100 % of average wage in the given economy and no children was used.

OECD values of the tax wedge were compared with values computed by the methodology of this article and also with the implicit tax rate measured by Eurostat. It is not possible to make final conclusion, because the data does not have the same nature (real data for the whole economy and a model tax payer).

This comparison shows, that for some countries (e.g. Estonia, Latvia, Hungary, Portugal, Slovakia and UK) it was more accurate to adopt the methodology used in this article while for other countries the value of Eurostat was more accurate (e.g. the Czech Republic, Denmark, Ireland, Netherlands, and Finland).

Results of the comparison cannot easily prove that one of the methodology is wrong, because since one cannot easily compare theoretical data for a specified person with the real data from countries. The real values could differ because of the number of children, tax deductible items, etc.

4 Conclusion

The aim of this paper was to re-calculate numbers for implicit tax rate (tax wedge) on labour in the EU countries for the newer period based on the Eurostat data and based on the Mendoza et al., (1994) and Wolff, (2005) methodology and to compare these values with the tax wedge measured by the Eurostat using their own methodology. Prior to this calculation, there were described some kinds of different tax rate measurement. From the microeconomic perspective, there is not one average, marginal or effective tax rate, as the tax subjects differ in their income and other conditions, decisive for the calculation of their tax liability. However, the effective tax rate should be calculated by each economic subject who considers relocating his or her activity into some country, because the effective tax rate gives better information than just the nominal tax rate.

We can get better results and county's overview from the macroeconomic measurements, which can give us information on the overall economy and this value could be compared with other countries. However, the taxpayer who decides about its country of residency will decide based on his or her actual or expected income and not based on the information on the economy as a whole.

Based on the data from Eurostat and the methodology by Mendoza et al., (1994) and Wolff (2005), new values for implicit tax rates on labour were calculated for the EU countries for the period from 2000 to 2015. Some variables were available only for certain years, so the missing observations were calculated based on the information on increases of these variables in relative terms.

Countries with the highest implicit tax rates on labour were the Nordic countries (Denmark and Finland) and France with the implicit tax rate on labour of over 50%. This is in line with expectations, as these counties have a high personal income tax rate (Nordic countries) or high social security contributions (France)

On the opposite side were Bulgaria, Slovenia, Netherlands and Croatia with the effective tax rate below 30%. These results were compared with the implicit tax rate computed by Eurostat, which is comparable with the implicit tax rate computed by the methodology according to Mendoza et al., (1994) and Wolff (2005). Countries like Bulgaria, Czech Republic, Germany, Poland and Slovakia have almost identical results for both indexes. On the other hands, there were also some countries (Denmark, Finland and Spain), which data differ from these two sources.

Because of these differences, the tax wedge measured by OECD was also used for comparison to find out, if any of the methodology set up incorrect. The tax wedge computed by OECD is not a real number, but it is calculated only for model tax payers (for the purpose of presented comparison was used a taxpayer with 100% of average wage and no children).

There was not found any evidence that neither methodology (the one used in this paper or the Eurostat methodology) is incorrect, because values of the tax wedge of OECD was in some cases more similar to data computed in this paper and in some cases the OECD values were similar to the Eurostat data.

As the range of possible measurement of the tax rate of labour is quite wide, each of this measurement should be analysed for possible influences on the country's competitiveness, because labour is an important productive factor and employees could be sensitive to the amount of their net income and employers have to monitor the company's costs.

Companies or individuals should also analyse the labour taxation before they set up their business or move their location into certain country. This analysis should not be done solely based on nominal rates, but it is better to use effective rates and compute all the costs related to employment.

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