EMPLOYMENT AND TAXATION IN OECD COUNTRIES

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Abstract

Labour market is a crucial segment of any economy, as a special place where labour demand can meet with labour supply. This market also has many specifications and characteristics that can be seen in every country. One specification is the taxation, which can influence both sides in the labour market. This empirical study has aim to examine possible effects of taxation in the labour market on employment and unemployment rate. In addition to the overall tax burden, focus is also set on tax progressivity as one of key factors. Method for estimation was chosen dynamic GMM estimator as the most suitable method. The key finding was a negative effect of labour tax progressivity on both extensive and intensive employment.

Keywords

Employment, Labour Market, Taxation, Tax Progressivity

I. Introduction

Unemployment and employment are macroeconomic indicators which are closely followed not only by economists but also politicians, media and broad public. Not only they are able to point out the general situation on labour market, but they can also outline a social or economic tension. This is most present in times of high unemployment, as many people are not able to find jobs, which has severe implications through the entire economy. Unemployment can have several reasons as shown by economic theory – insufficient demand for labour caused by higher costs for employers, bad economic situation resulting in low demand for goods and service or excessive taxation of the labour itself.

We are currently experiencing a difficult period caused by pandemic situation worldwide. This presents yet another challenge, as situation in the labour market can worsen in many countries. Governments also depends on the stable market for many reasons, fiscal cause is one of them. Governments rely heavily on income originating from taxes derived from labour, so higher unemployment means lower income. And on the other hand, higher unemployment equals to higher unemployment insurance payments paid from public budget. Both implies worse fiscal position for respective government. Thus, government should be rather careful with taxation policy changes in order to not create any further distortionary effects.

Aim of this paper is to examine possible effects of labour taxation. It will not show any effects linked to changes due to pandemic, but rather check the possible effects of taxation, tax progressivity included, on employment and unemployment in pre-covid time period in multiple economies. Comparing labour taxation among countries is rather difficult, as government impose different tax rates, tax exemptions, tax deductions and other systematic settings such as income tax progressivity, which in overall affect economic subjects.

To help the international comparison of labour taxation, the tax wedge indicator is used. It calculates the difference between total cost for labour payed by employer and the net wage received by employee. The difference is total sum of financial means, which is taken by government in form of income tax, social contribution and other payments. This way, tax wedge can be used as an approximation for tax burden. More about tax wedge can be found in data section later in the paper.

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Economic researchers often focus on distortionary effects of taxation on economic activity, which is often linked to either real GDP or similar indicator. This paper, as the title suggests, will take a slightly different approach. Instead of looking at GDP, effects on employment will be considered. For more robust analysis, employment will be checked both from extensive (what portion of population is economically active) and intensive (how many hours on average will typical worker spend in work) aspect. Together with unemployment rate it should provide complete picture, how taxation can influence employment in observed countries.

This paper is structured as follows. A brief empirical literature is presented in the second chapter, the third chapter shows definition, explanation and overview of all data used. Once all data are defined, the fourth chapter explains the methodology used followed with empirical results of estimation after that. All findings are then highlighted in the last chapter.

II. Literature review

Scientific literature offers many examples of empirical studies, which are focused on labour taxation and possible repercussion on economic activity and employment. Many authors tried to analyze the relationship between these economic variables using econometric techniques such as linear regression models. Use of unemployment or employment rate as a dependent variable was common among these authors.

Alesina and Perotti (1997) has presented a theoretical model which was also empirically tested on panel of 14 OECD countries. The main conclusion of their testing was finding that redistribution policy of government increases unit labour costs. Another finding was for this redistribution policy to be primarily funded by labour taxes. This situation has a negative consequence due to loss of competitiveness and eventual fall of employment in several branches of the domestic economy, according to Alesina and Perotii (1997).

Another example of a panel study is the one in Daveri and Tabellini (2000). They also examined 14 OECD countries as previous authors. However, they added labour market institutions as explanatory variables. Based on power or concentration of unions in selected countries, a strong negative correlation between labour taxation and employment was found. This effect was stronger in continental Europe against the rest of OECD. Their estimates suggested a negative effect of ten percentage point increase in labour taxation to lower employment rate by 4 to 5.5 percentage point.

Authors followed the examples of these original researches by extending the datasets, using different indicators of taxation or instead of a panel study, focusing only on a specific country or region. Festa (2012) focused on Italy in period 1970-2004. He was the one to use tax wedge indicator and to check effects on regional employment. Festa (2012) found a negative effect of tax wedge on a private dependent employment in the short-term. Short-term effect is due rigidity of real wages.

Deskar-Škrbić et al. (2018) examined effect of taxation on employment in Croatia. As Croatia had one of the lowest employment rates in the past decade, the issue is quite important for their policymakers. Results of authors indicated that increases in tax wedge have statistically significant negative effects on the level of employment. They also highlighted use of tax wedge as tax burden indicator, because taxation of income on itself may not indicate tax burden fully without adding the social contribution.

Dolenc and Laporšek (2010) examined panel of 27 EU countries to find a mild but significant negative effect of tax wedge on employment. Their estimates showed one percentage point drop in tax wedge should promote employment by 0.04 percentage point. However, for sub-group of countries with higher tax wedge is this negative relationship stronger. Benefits from tax wedge reduction were also examined in Attinasi et al. (2016). They used a New Keynesian DSGE model to check budget-neutral changes in fiscal policy with a common feature – lowering tax wedge. Main finding was that a reduction in the tax wedge is beneficial in terms of both output gains and welfare. More welfare enhancing effect was present while budget neutrality was accomplished by also lowering public

spending. Most positive output effect was present when tax wedge reduction was offset by consumption tax increase. Similarly, shifts from labour income taxation towards indirect taxes was also seen as positively affecting economic activity in Zimčík (2018).

Another important aspect of tax wedge is tax progressivity. This was examined by Lehmann et al. (2016). They tested theoretical predictions on a panel of 21 OECD countries. Tax progressivity is characteristic by lowering tax burden on workers with the lowest real wages. On the other side, the burden is then passed to earners with the highest wages. This principle is being used as one of the possible redistribution tools. Lehmann et al. (2016) used Coefficients of Residual Income Progression and developed a new indicator of progressivity based on OECD tax wedge indicator. They discovered that more progressive taxation of labour can improve employment, specifically employment of low-skilled workers. However, they also found an adverse effect on overall productivity per worker originating from tax progressivity. They estimation result was for one percentage point increase in progressivity, which can be imagined as half percentage point decrease of low-income workers tax wedge and half percentage point increase of high-income workers tax wedge simultaneously, to boost employment by 1.01 percentage point.

This paper build on these previous empirical studies, while using the latest extended dataset to provide additional results to enrich current scientific literature.

III. Data

Research in this paper follows the previous empirical literature with few modifications. The more recent dataset is used to obtain the latest results in this field. Annual data from period 2000-2019 are gathered for this dataset while the cross-section part includes 25 OECD member states.[1] Panel data provides a perfect opportunity to study data internationally and over a long-time horizon. This dataset contains 25 cross-section units with 20 time-observations in each.

Two indicators of employment together with unemployment rate are examined in this study. This approach is helpful to better capture possible effects of income taxation in the labour market. First indicator is employment rate expressed as the ration of employed individuals to the working population. The employment rate measures so-called *extensive employment*.

The second indicator of employment is the number of average annual hours in actual work per one worker. This is called *intensive employment* and shows how many hours on average workers spend in their jobs. A difference can be found in certain countries, which are characterized by high extensive but low intensive employment and conversely. OECD countries are quite heterogenous in this regard, as you can see in figure 1.

It contains the latest available data for selected 25 OECD member states. X-axis shows extensive employment, while Y-axis represents intensive employment. Majority of countries fall into category with extensive employment in range from 65% to 75% and intensive employment between 1500 – 1900 hours per year. However, there are also few countries with extreme values in both directions. Put together, the linear trend is visible, as you can notice an inverse relationship between extensive and intensive employment across these 25 OECD countries.

Extreme cases are in Greece and Mexico, where these countries have maximum values for intensive employment with lowest extensive employment simultaneously. On the other side, countries such as Netherlands, United Kingdom and Japan have it the opposite way. One of the reasons may be a ratio of part-time employment. While Greece has this ration under 10%, UK has it over 22% and Netherlands even over 36% according to OECD statistics.

[1] List of selected countries in alphabetical order: Australia, Belgium, Canada, Czech Republic, Estonia, France, Greece, Hungary, Ireland, Israel, Japan, South Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Poland, Portugal, Slovakia, Spain, Turkey, United Kingdom and United States.

Figure 1 Extensive and intensive employment in OECD countries (2019)

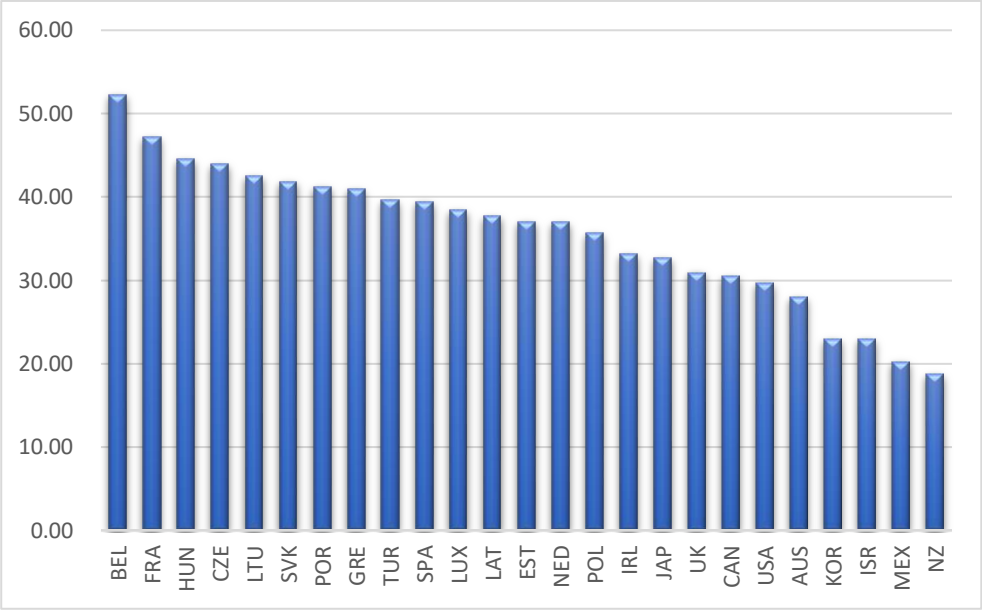
Source: OECD Statistics (2021), own processing

The last indicator linked to the labour market, which figures as a dependent variable in this study, is *unemployment*, more precisely unemployment rate. Reason, why this variable is also included in the empirical analysis is to better capture effects of taxation and which side of labour market is primarily affected. Drop in employment does not necessarily means rise in unemployment. This will be discussed in more details in the next chapter.

After dependent variables, we will take a closer look on independent variables, regressors used in econometric estimation. Following the aim of this paper, two tax variables are presented. *Tax wedge* indicator, which was already briefly described in the introduction and *tax progressivity* indicator. Tax wedge on labour is the difference between the total labour costs and net wage of a single average worker, expressed as a percentage of the total labour costs. It factors not only personal income taxes but both employee and employer social insurance contributions. This provides a useful measure to compare tax burden on labour and employment. Benefits of tax wedge as tax burden indicator can be seen also in Hodge and Hickman (2018). It is more suitable than widely used tax revenue indicator because tax wedge is only dependable on system setting of personal income taxes and social security contributions. Tax revenue indicator, mostly used as GDP ratio, is influenced not only by government policy changes, but also by overall economic environment with massive changes due to business cycles or other situations unrelated to intended government policy.

Same as OECD countries differ in employment statistics, they have different values for tax wedge. This is visible in figure 2, which shows the latest available data for tax wedge in international comparison. The highest tax wedge over 52% is in Belgium meaning that average worker gets less than half of total labour cost paid by his employer as his disposable income. Belgium is followed by France and Hungary, both with tax wedge over 45%. You can clearly distinguish that higher tax wedge is paid in continental Europe comparing to the rest of OECD countries. All countries which have tax wedge under 30% are countries outside Europe, such as New Zealand, Mexico, Israel and others.

Figure 2 Tax wedge for worker with average earnings in OECD countries (2019)



Source: OECD Statistics (2021), own processing

Tax wedge construction offers another benefit. It can be used to measure tax progressivity as well, similarly to approach in Lehman et al. (2016). Values in figure 2 are stated for workers with 100% of average earnings in respective countries. However, you can calculate tax wedge for any percentage of average earnings. You can then compare tax wedge for low-income workers and high-income workers. Bigger difference will implicate more progressive taxation of labour. This is particularly helpful to compare tax progressivity in countries with flat income tax rate, where progressivity can be caused by tax deductions and exemptions.

We can compute tax progressivity based on OECD statistics data, however there is one limitation. Necessary time series are listed only in range from 67% to 167% of average earnings. Hence, this max range will be used to calculate our proxy variable for tax progressivity. Designation for this variable is *prog* and it is calculated by following equation:

$$prog_{i,t} = \frac{TW167_{i,t}}{TW67_{i,t}} \tag{1}$$

where numerator is tax wedge for worker with 167% of average earnings for given country and year, while denominator is the same, only for worker with only 67% of average earnings. Variable prog does not show labour tax progression between all wage levels but specifically between these two limits. If the tax wedge is equal between the two wage levels, variable prog will have value 1 and there is no tax progressivity associated with labour income. Values larger than 1 imply labour tax progressivity.

Considering previous empirical research listed in literature review section, macroeconomic control variables needs to be added to empirical estimation. Employment and unemployment are closely linked with output activity inside economy, so it is essential to control for any overall changes which may also impacted the labour market itself. For this reason, annual GDP growth and CPI inflation are added as control regressors.

Last group of independent variables are added to compare labour market characteristics. Naturally, labour markets across OECD countries are very different because of historical and cultural differences, institutions and other unique attributes. Two variables are considered as they can quantify some attributes of labour market – *union density* and *minimum wage*. Union density is expressed as ratio of all employees who are active in unions. This represents negotiation power of employees over wages, benefits and other work-related characteristics. Minimum wage is set on centralized wage

level. Employers cannot pay wage lesser than minimum wage to their employees. Not all OECD countries do have centralized minimum wage. Examples are Finland, Sweden, Germany and others. This is the reason why we cannot use data for whole OECD countries and only have panel of 25 countries in our dataset. Minimum wage is not used in absolute value but rather as a ratio of average wage in specific country and period. This ratio is more meaningful for international comparison, so it cannot be distorted by exchange rate changes or different purchasing power.

Above are listed all variables measured and used in this paper. You can find descriptive statistics of dataset in table 1. OECD Statistics is source of all data used.

Table 1 Descriptive statistics of variables

Variable	Mean	Min	Max	Label
Employment rate (%)	65.0	44.1	78.2	Extensive
Average annual working hours	1757.4	1411.0	2228.0	Intensive
Unemployment rate (%)	8.1	2.0	27.5	U
Real GDP growth (%)	2.7	-14.8	25.3	GDP
CPI inflation (%)	2.9	-4.5	54.9	CPI
Tax Wedge (%)	35.8	12.7	57.1	TW
Tax progressivity (TW167/TW67)	1.3	0.9	2.6	Prog
Union Density (%)	19.9	4.5	57.6	UD
Minimum wage (ratio of average wage in %)	37.5	22.3	56.2	MW

Source: Author

IV. Methodology

Panel dataset is used with description of variables mentioned above. Panel contains 25 OECD member states over period from 2000 to 2019. This is due to data availability limitation as data for few variables is not available before year 2000. Furthermore, for some variables data is not present at all, as explained on example of minimum wage. As panel data combines both time-series and cross-section data, it can provide more information. Panel data can control for heterogeneity among countries caused by their informal and formal institutions, attributes of labour market and overall economic situation. This would create a certain form of bias in case of a different approach.

Three dependent variables are utilized in this research. Two employment variables considering either extensive or intensive aspect of employment are complemented with unemployment rate. As mentioned in Zimčík (2019) adding unemployment rate as dependent variable provides additional information. You can check if excess taxation of labour may decrease employment because wage costs of employees are so inflated that employers restrict demand for workforce, or because net wage of employees drops below their reservation wage.

In case of the former, the extensive employment rate drops while unemployment rate rises. Former employees are still looking for new jobs. If it is the latter, the employment rate drops but unemployment does not change. The former employees are then not motivated to look for jobs, if they expect their wage to be below their reservation rate. They may find alternatives in form of social benefits or unemployment insurance. Alternatively, they may even start to work outside the official labour market without the requirement to pay taxes, as explained in Kotlán et al. (2019) on example in Czech Republic. Unemployment rate is added to see any interactions with the extensive employment.

GMM estimator with time fixed effects was chosen to obtain estimation results in this paper. This estimator is an adequate tool because it does not require assumptions for distributions and can allow for heteroskedasticity. Furthermore, the GMM estimator is efficient for data, which has more individual units (N) than time periods (T). This is the case for our dataset. For detailed explanation regarding GMM estimator, see Baltagi (2013). The efficiency of GMM estimator with lagged

dependent variable as an instrument can be assessed by the J-statistics. It results of over-identification test also known as Sargan test. Sargan test has double null hypothesis according to Kennedy (2008). First, the over-identifying instrument is uncorrelated with error and the specification of an instrument is valid (instrument should not be included as an independent variable). Both these hypotheses are not rejected based on J-statistics in table 2 (see p-value of the test).

Data needs to have proper qualities for the panel estimation. The intensive employment dependent variable has a high spread of values with higher order than other variables. This is caused by nature of the data, which is calculated in hours per year. This spread can be easily solved with logarithm transformation of this variable. Another issue with panel data is time-series component and problem with unit root. Normally, this could be tackled by stationary testing and transformation to first differences. All variables were tested for presence of common or individual unit root in levels and first differences. Unit root tests detected a common unit root process presence in levels for few variables, however first differences of all variables indicated no presence of unit root. Since we use GMM estimator with time fixed effects and difference transformation and form of dataset is N>T, we can proceed with GMM estimation with level variables. GMM estimator uses lagged dependent variable as regressor. This however decreases degrees of freedom and number of observations used for estimation. Estimation uses a two-period lag of dependent variable in this research.

Using all variables with multiple dependent variables, the estimated econometric equation has following form:

$$Y_{i,t} = \gamma_1 Y_{i,t-1} + \gamma_2 Y_{i,t-2} + \beta_1 GDP_{i,t} + \beta_2 CPI_{i,t} + \beta_3 UD_{i,t} + \beta_4 MW_{i,t} + \beta_5 TW_{i,t} + \beta_6 Prog_{i,t} \qquad (2)$$

Y is one of dependent variables, $\beta 1,...,\beta 6$ are coefficients of independent variables. Again, this form does not represent a single equation, but a vector of three equations with different dependent variables. Dependent variable representing intensive employment (Intensive) is used in natural logarithm from as explained earlier. Results of estimation are subject of next chapter.

V. Empirical results

This chapter contains results of GMM estimation with fixed time effects and difference transformation, which is extension of research in Zimčík (2019). Table 2 offers results of regression for 25 OECD countries, which follow econometric equation (2). Kindly note that multiple dependent variable approach is used, and you can find estimation of coefficients for each dependent variable in columns two to four.

Prediction of results based on theoretical knowledge from previous studies and the economic reality is following. Control variable GDP should be positively correlated with extensive employment as boom in economic activity should promote it. The opposite can be anticipated in column four as inverse relationship between economic growth and unemployment is described by Okun´s law.

The union density as one of labour market attributes is anticipated to have a similar effect on extensive employment and unemployment. More union density means a higher negotiating power to increase wage levels, which dampen labour demand and employment should drop. There are no theoretical studies to predict impacts of these labour market specifics on intensive employment. We can, however, anticipate the impact of these specifics on labour supply side because they increase nominal wages. It mainly depends on the prevailing effect caused by wage increase. Either, the substitution effect will be dominate and workers would work more, because leisure becomes more expensive, or income effect will prevail, and workers restrict they work. This is just basic logic based on microeconomic theory. Based on the same logic, we could anticipate demand response from employers, which could limit work hours due to higher wages. Tax wedge increase then should be negative for employment and positive for unemployment. We can now compare theoretical predictions with results in table 2.

Table 2 Coefficient estimation using two-step GMM estimator[1]

Dependent variable	Extensive	ln(Intensive)	U
DV (-1)	0.5698***	-0.1492***	0.6584***
	(15.95)	(-3.76)	(21.07)
DV (-2)	-0.0501*	0.0447*	-0.1674***
	(-1.82)	(1.89)	(-7.16)
GDP	0.1330***	0.0002***	-0.1499***
	(7.98)	(2.98)	(-14.92)
CPI	0.1294***	-0.0007***	-0.0049
	(5.36)	(-3.14)	(-0.24)
UD	-0.3698***	-0.0023***	0.4587***
	(-8.70)	(-8.37)	(12.74)
MW	0.0373**	-0.0011***	-0.0377***
	(2.28)	(-5.14)	(-2.71)
TW	-0.0063	0.0040***	-0.0372
	(-0.16)	(10.80)	(-1.15)
Prog	-1.4644**	-0.0369***	1.4599*
	(-2.16)	(-3.82)	(1.91)
Instrument rank	178	174	180
J-statistics	154.30 (0.46)	153.85 (0.38)	143.46 (0.74)
Observations	348	333	347

Source: Author´s calculations

Starting with control variables, results for union density are in accordance with theoretical predictions. A higher union density is associated with lower extensive employment and higher unemployment rate. We can also see a small but positive effect on logarithm of intensive employment, meaning that higher union´s bargain power can lead to smaller number of working hours on average. Another control variable was GDP growth, which has a positive association with extensive employment and almost identical but opposite correlation with unemployment. A positive influence of economic activity on employment is then present in our dataset as well.

Minimum wage is another labour market characteristic. MW shows ratio of minimum wage to average wage in each country. Our data shows that higher the ratio of minimum wage, higher the extensive employment. Specifically, a minimum wage ratio increase by one percentage point of average wage is associated with almost 0,04 percent increase in extensive employment. For unemployment, this is again inverse with almost identical size of coefficient. A small negative effect of minimum wage ration is also present for logarithm of intensive employment. Hence, in countries with higher ration of minimum wage, workers tend to work less hours on average.

Lastly, we can interpret taxation variables. In our data, we did not have any statistically significant relationship between tax wedge and extensive employment nor tax wedge and unemployment. Only statistically significant result is a positive relationship between tax wedge and intensive employment. Hence, workers in countries with higher tax wedge tends to have longer working hours on average.

[1] Appropriate t-statistics for each variable are listed in parentheses. The number of stars next to each coefficient represents significance level: (*) 10%, (**) 5% and (***) 1%. All coefficients are round to four decimal points, while t-statistics are round up to two decimal points. Dependent variables are in following order – extensive employment, intensive employment, and unemployment rate. Lagged dv represents lagged dependent variable for each case.

Unfortunately, as results for extensive employment and unemployment are not statistically significant, we cannot provide any remarks regarding possible move of workforce outside the official labour market due to excess taxation of labour.

Last tax variable is tax progressivity measured by proxy Prog. Based on results in table 2, higher progressivity of labour taxation is associated with lower extensive employment and higher unemployment rate. Higher tax progressivity is also present in countries with less worked hours on average, according to coefficient in third column.

VI. Conclusion

The aim of this research paper was to examine possible effects of labour taxation on employment and unemployment rate. Panel dataset of 25 member states of OECD over 20 years period was used for this research to capture possible effects of labour taxation. There are several scientific benefits of this study to enrich existing empirical literature. Multiple dependent variable model was estimated, where effects on employment is analysed for extensive and intensive employment. Testing effects simultaneously on unemployment rate better shows impact on whole labour market.

Tax wedge indicator was used for multiple reasons. It can simulate tax burden on labour, but also distinguishes and quantifies progressivity of such taxation. This indicator has many benefits, but the ultimate one, which makes it the most suitable for this kind of research is, that it provides a relatively easy comparison among different countries. Tax wedge showed that non-Europe countries have a smaller labour taxation than European countries in OECD.

However, no significant relationship was found between tax wedge level and employment. Only a statistically significant positive correlation with intensive employment. So, countries with higher tax wedge does not have smaller employment rate, but rather workers in these countries tend to work more hours in a year on average. Hence, people may not be discouraged from work by high labour tax burden. This may have several reasons, one to be linked with public goods and services. Countries may provide high quality and quantity of public goods and services in return for a higher tax collection. This way, working-age population can accept higher taxes inflicted on labour, as they see proper benefits coming from them. This may also apply for Nordic countries, which are not present in research due to missing a centralized minimum wage.

Another finding was a negative tendency of labour tax progressivity towards both extensive and intensive employment. As a similar but opposite effect is present for unemployment as well, it seems that a higher progressive scheme of labour taxation does not seem to discourage only workers but also employers regarding how many people to employ and how long hours they should work. However, this discouraging is shown as rather mild. Coefficient -1.46 means that extensive employment rate would be lowered by 1.46 percentage point if perfectly proportion tax scheme was suddenly made progressive, where high earning workers would pay double portion of their wage as taxes than low earning workers. Such jump in tax progressivity is extreme and rather impossible to implement in case of a real economy.

Benefit of this study was inclusion of labour market attributes such as union density and minimum wage. Higher negotiating power of union tends to lower employment rate. Results also shows that it can also lower intensive employment, so employees will work less hours on average in countries and periods where union density is higher. This may be result of such union negotiation as the unions can push not only for higher wages but also for better work condition, such as fewer working hours per week/month, etc.

Minimum wage was not examined in absolute values but rather as a ratio to average wage in each country and in each time period. This provides many benefits for it can better compare purchasing power of minimum wage. Results show that higher minimum wage ratio, higher the extensive employment. This result does not support claim regarding negative effects of minimum wages on employment. It also shows that a higher minimum wage ratio cuts average working time.

Results in this study not only serves as a contribution to the scientific empirical literature but also serves as a baseline for future research. As we could identified a significant difference in labour tax burden calculated by tax wedge indicator between European and Non-European member states of OECD, we can expand future research with cluster analysis to better capture effects of labour taxation.

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