Research Article

A European Perspective of the Minimum Wage Impact upon Labour Market

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Abstract

Minimum wage policy is a highly controversial subject in the international literature, in which there are surprisingly contradictory theoretical and empirical findings. In this paper we focus on modelling the robust dependencies between minimum wage and net earnings for a set of 20 European Union member states during the period 2000 – 2012, for which macro data was available. We draw on panel data estimation to quantify the minimum wage impact upon earnings and employment rate, where several other macroeconomic indicators were also included. The results indicate that the minimum wage has the greatest positive impact on earnings, higher even than the influence of the macroeconomic outcome (GDP), whereas it has a negative effect on the employment rate.

Keywords: minimum wage, earnings, employment rate, panel data model, European Union

Introduction

Broadly speaking, minimum wage is defined as the lowest level of pay under which no employment is allowed. In a market economy, although the determination of wages is mainly the result of a negotiation between employers and workers, there are mostly moral grounds to justify the existence of a minimum wage, since the society argues there is a threshold of pay below which employment is not acceptable, even if there would be employers and workers willing to trespass it. In general, such a threshold may be set either by the government through various regulations, or through collective bargaining by social partners. Moreover, according to the Keynesian policy framework, the existence of minimum wages is justified as a stimulation of aggregate demand.

It is therefore obvious that it is worth investigating in depth the role played by the minimum wage upon the labour market. As empirical analysis, we find of high importance the focus on minimum wage immediate effects, as well as the delayed impact upon the main labour market indicators, such as earnings and employment.

In this paper, we will focus on modelling the robust dependencies between minimum wage and net earnings on one side and also between minimum wage and employment rate on the other side, for a set of 20 European Union member states during the period 2000 – 2012, for which macro data were available. We draw on panel data estimation to quantify the minimum wage impact upon earnings and employment rate, where several other macroeconomic indicators were also included in the model: GDP, the employment rate for the 15-64 age group with low education (ISCED 0-2) and medium education (ISCED 3-4), as well as the implicit tax rate on labour.

The structure of the paper is the following: Section 2 presents a short literature review on the role of minimum wage on the labour market; Section 3 is dedicated to the data description; while the research methodology is presented in Section 4. The results of the econometric approach are summarised in Section 5 and the last section concludes the paper.

Literature

Minimum wage impact upon labour market is a highly controversial subject in the international literature, in which there are surprisingly contradictory theoretical and empirical findings. For instance, in the standard neoclassic model, the minimum wage is either irrelevant or may lead to unemployment. In the context of a competitive labour market, a minimum wage set below the equilibrium level between suppliers and buyers of labour would simply be irrelevant. But a minimum wage above the equilibrium level would necessarily lead to unemployment, since it would make some low-paid workers that are normally low-skilled and/or young too costly for employers to hire with profit, while simultaneously increasing the number of people willing to work because of the attractiveness of higher salaries. Therefore, from this perspective the minimum wage policy tends to actually damage those that it intends to help (Fernández-Macías and Vacas-Soriano, 2013).

On the other hand, at the macroeconomic level, according to the Keynesian approach, higher minimum wage does not necessarily lead to higher unemployment. But, it will normally affect industry prices, altering the structure of supply and demand with quite unpredictable effects on the overall employment. However, since workers paid at a minimum wage level have a higher propensity to consume, it is generally believed that a minimum wage growth may actually support an increase of the aggregate demand, output and employment (Herr and Kazandziska, 2011).

Another point of view suggests that even if minimum wage is assumed to have a rather negative impact on the employment of the least productive workers, a binding minimum wage could also stimulate such workers to increase their training and education in order to improve their productivity levels and remain employed (Cahuc and Michel, 1996).

At an empirical level, most studies show inconclusive results of the minimum wage impact upon employment, but still remains one of the most researched topics in labour economics. The general conclusion among most economists until early 1980's was that an increase of the minimum wage leads to a negative impact on employment, especially for young and low-skilled workers. More precisely, Brown (1982) stated that "a 10% increase in the minimum wage reduces young employment by 1 to 3%". However, these findings were soon challenged by other empirical studies (Card and Krueger, 2000) where much smaller effects or even often not statistically significant results were found.

Regarding the role of minimum wage upon earnings and inequality, although not explicitly, minimum wages seem to compress the wage distribution by raising the lowest wages and therefore by reducing inequality. In case such an increase would affect some workers under the poverty line, it would also reduce poverty. But the scale and importance of such effects are largely an empirical issue, which depend on the number of workers

affected by the increase and the household distribution of income. Most existing research on this issue does show that minimum wages play an important role in explaining the patterns of wage inequality in the lower tail of the distribution, not only directly by raising the lowest wages, but also indirectly through spillover effects (Teulings, 2003; Autor, Manning and Smith, 2010).

The economic theory also emphasises on the idea that wages should evolve in line with productivity to keep unit labour costs stable. Otherwise, the effect of a national minimum wage increase might extend at an international level, especially in terms of competitiveness. This can be sustained by the fact that if a country increases its minimum wage, without any corresponding increase in productivity, the costs faced by the national companies will increase and they will become less competitive in comparison to their competitors from other countries. Thus, its effect will be larger in labour intensive industries, where labour costs represent a higher share of the total costs faced by firms.

All in all, minimum wage is considered as a cornerstone of the European Social Model, although the on-going process of European integration had so far very little to do with it. Wages are explicitly excluded from the competences of European institutions in the existing treaties, contrary to other areas of work and employment such as working time or health and safety. Since the E.U. was born there has been debates whether a European coordination of the minimum wage policy should be developed and what kind of implications would there be. In order to find answers to these questions a rigorous analysis of the minimum wage policy is required
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Data description

In this paper, we used annual data for 20 European countries, for the period 2000-2012. The choice of countries selected for analysis was made based on whether they have a minimum wage in use or not. Thus, there are 21 countries (out of 28) in the European Union that use a minimum wage: Belgium, Bulgaria, Croatia, Czech Republic, Estonia, France, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and United Kingdom. Because data availability on Croatia is still scarce, we excluded it from our investigation.

Our focus was on the impact of minimum wage on earnings and employment rate, but we also introduced in our analysis some variables like the gross domestic product, the implicit tax rate on labour (%), the employment rate for the 15-64 age group with low education (ISCED 0-2) and medium education (ISCED 3-4). The minimum wage, the net earnings and the GDP are expressed in the prices of 2005 in order to have comparable data. The source of the data was the Eurostat Database.

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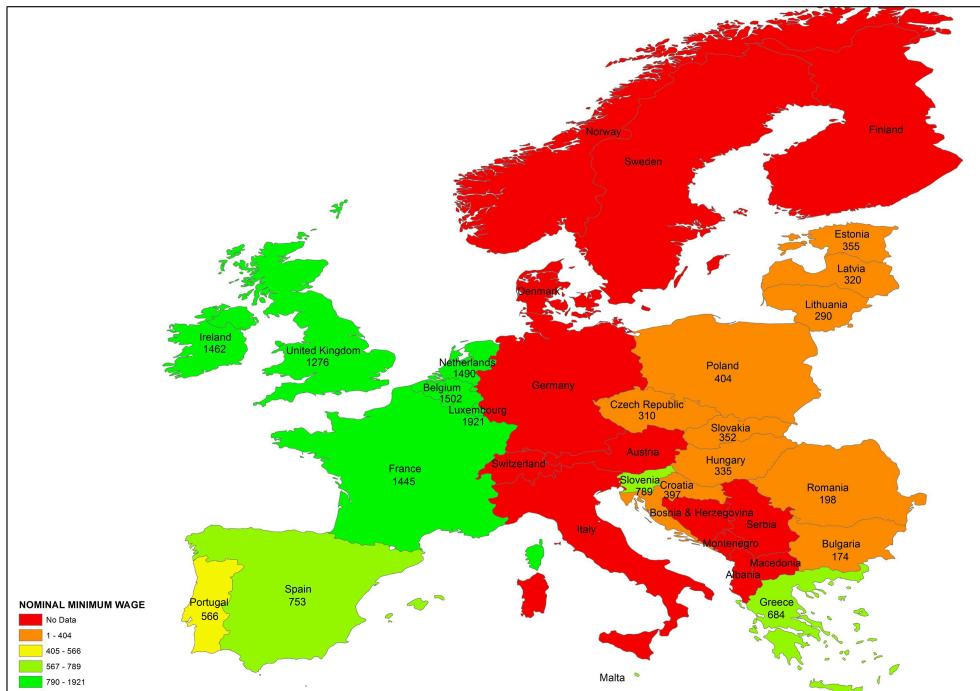
Data source: data from Eurostat database, authors' calculations

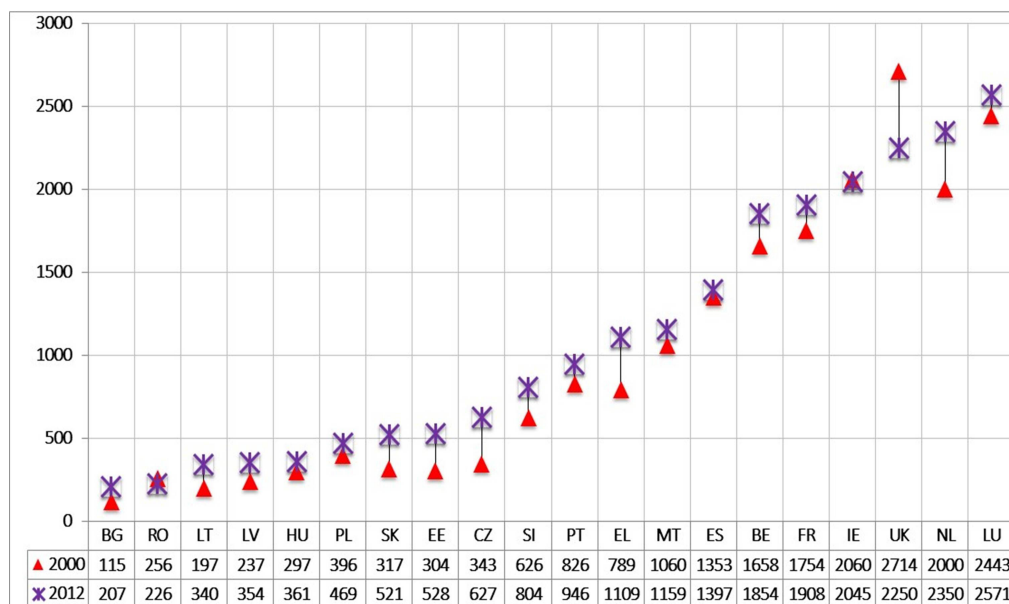**Figure 1: Minimum wage across European Union, 2014**

In the European Union, the minimum wage is set only in a number of countries. As for 2014, we could identify several major groups: the lower segment (with minimum wages under 500 euros), the middle section (with the minimum wage between 500 and 1000 euro) and the upper section (with minimum wages above the 1000 euro threshold). Out of 21 countries with a minimum wage in action, almost half of them are placed in the lower segment of the distribution, suggesting that the minimum wage is not set at very high levels. In this group of countries, we find Bulgaria and Romania, but also Poland, Estonia or Hungary. Very high minimum wages are implemented in the west countries, but the highest level is recorded in Luxembourg (almost 2000 euro). Looking at the lowest and the highest minimum wage, one can observe the huge difference between the two, the minimum wage in Luxembourg being 11 times higher than the one in Bulgaria.

Analysing the evolution of the minimum wage in the 2000-2012 period, we found that the most significant increases were recorded in the Central and Eastern European countries, with at least 111% (in Romania the increase was of 572%, with an average annual growth rate of 14.6%). At the opposite end, the minimum wage grew with only 26.3% (an AAGR of 1.7%) in Greece.

For the net earnings, we decided to represent the values at the beginning and the end of the period analysed in this paper. Therefore, from figure 2 one can see that in most cases the earnings were higher in 2012. Still, in Ireland, Romania and the UK, the earnings (expressed in 2005 prices) were higher in 2000 by 0.7%, 11.9% and 17.5% respectively. Although in percentage, the difference between earnings in Romania and the UK is not so obvious, when seen on figure 2, it seems quite significant.

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On the other side, the earnings grew (as expected) in the other countries, less in Spain (3.2%) and Luxembourg (5.2%) and

more in the Czech Republic (83%), Bulgaria (80.3%), Estonia (73.6%), and Lithuania (72.8%).

	BG	RO	LT	LV	HU	PL	SK	EE	CZ	SI	PT	EL	MT	ES	BE	FR	IE	UK	NL	LU
▲ 2000	115	256	197	237	297	396	317	304	343	626	826	789	1060	1353	1658	1754	2060	2714	2000	2443
✖ 2012	207	226	340	354	361	469	521	528	627	804	946	1109	1159	1397	1854	1908	2045	2250	2350	2571

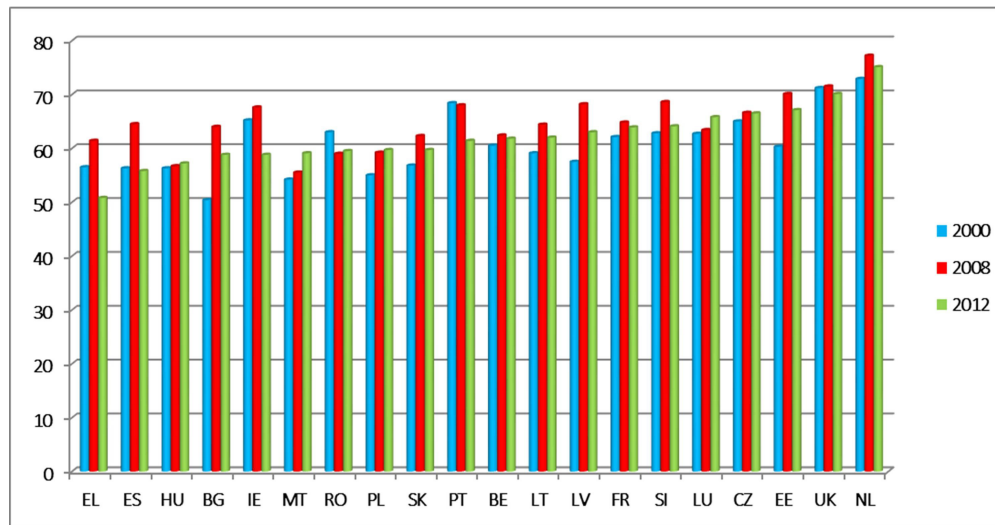**Data source: data from Eurostat database, authors' calculations**

Figure 2: The net earnings, prices of 2005

Much of the increase in this period is due to the economic growth experienced before 2008-2009. In 2009, almost half of the countries in this sample experienced various decreases in the net earnings (as compared to 2008): Poland (18.5%), Romania (14.4%). In 2010, there were still some decreases, but with small intensities (0.32%-3.09%). Although Greece did not experience any decreases in 2009-2010, the earnings in 2011 fell by 21% as compared to 2009. Another interesting case is that of the UK, where the earnings first fell in 2008, by 15% and continued to decrease until 2011 (the difference against 2007 being of 27%).

The employment rate was on an ascending trend until 2008, with increases of 10.7

percentage points in Latvia and 13.6 pp in Bulgaria. Still, in Portugal and Romania the employment rate was lower in 2008 compared to the level of 2000 (0.4 pp lower in Portugal and 4 pp lower in Romania). The economic crisis led to a decrease of employment in most countries. Although there are some countries with a positive gap between 2008 and 2012 (Hungary, Malta, Romania, Poland, Luxembourg), it is well known that Greece, Spain and Ireland were the most affected countries in terms of employment.

In 2012, the employment rate was the highest in the Netherlands and the UK (more than 70%), while in Greece and Spain the lowest levels were registered (around 50%).

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Data source: data from Eurostat database, authors' calculations

Figure3: the employment rate, 15-64 years

The effects of the economic and financial crisis led to a lower economic performance of the EU Member States in the last six years. The GDP growth in the EU-28 underwent a substantial deceleration in 2008, and in 2009 the GDP decreased significantly in the 27 Member States as a result of the economic crisis, except for Poland which recorded an increase of 2.6%. Since 2010, the GDP has recovered, and this trend continued in the following years.
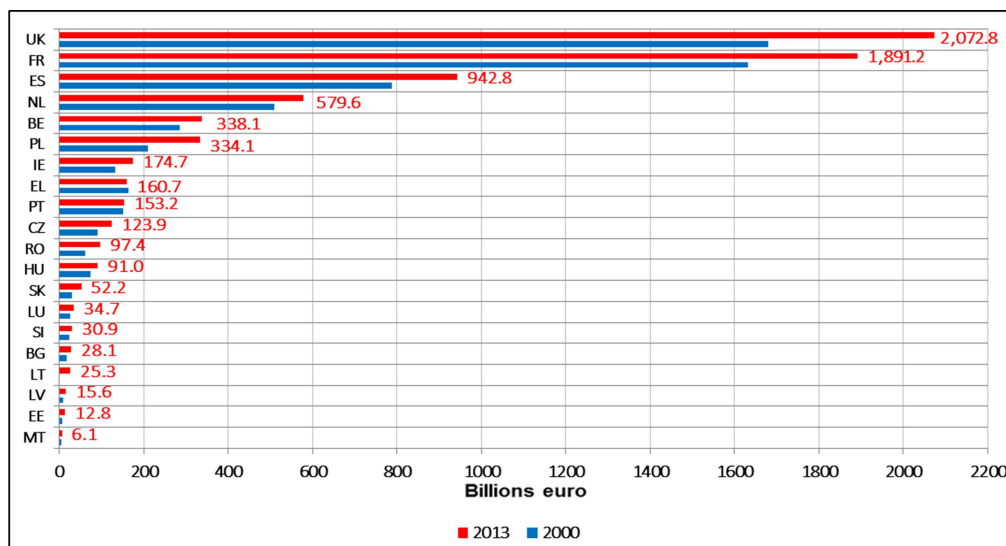
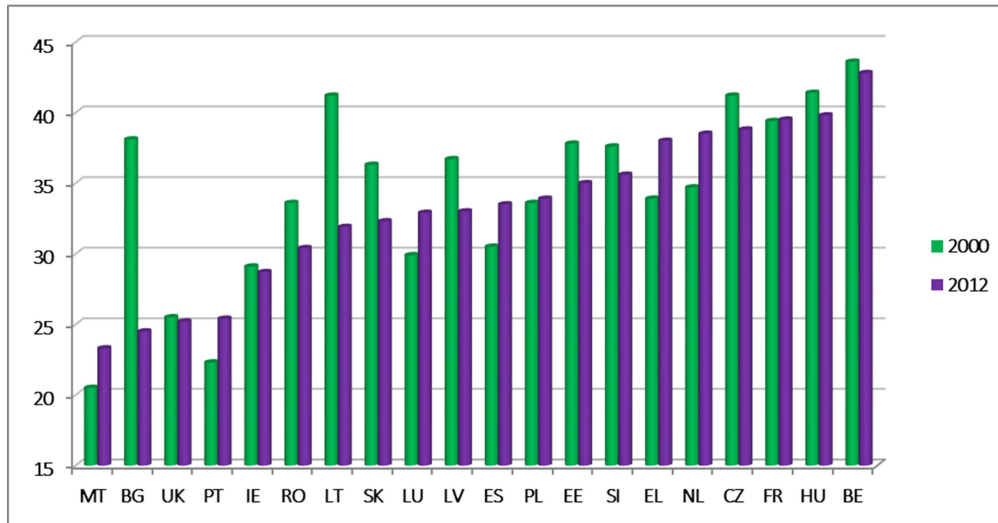**Data source: data from Eurostat database, authors' calculations**

Figure 4: The gross domestic product, prices of 2005

Comparing the GDP in the period 2000-2013, we see that most EU countries recorded an increase in GDP, and managed to overcome the impact of the crisis. Analysing the group of the 20 states that have regulated by law the minimum wage,

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we notice that the most significant increases in the GDP in 2013 compared to 2000 were recorded by the emerging economies in Central and Eastern Europe and in the Baltic area (increases of more than 50%). Portugal recorded the lowest GDP growth in 2013 compared to 2000, only 0.7% and Greece is the only EU country that recorded a decrease in GDP of about 2.5%.

In the period 2000-2012, the level of the implicit tax rate on labour decreased in most of the EU countries analysed. This decrease is largely caused by the effects of the economic crisis, which forced the Member States to seek solutions to mitigate unemployment, promoting policies to stimulate employment, such as the one related to the reduction of labour taxation.

Data source: data from Eurostat database, authors' calculations

Figure 5 Implicit tax rates on labour (%)

The most significant reductions in the implicit tax rate on labour occurred in Bulgaria (13.6 pp) and in Lithuania (9.3 pp). Greece recorded the highest growth of the implicit tax rate on labour in the analysed group of countries (4.1 pp), indicating that there was a trend more towards a policy to increase the revenue of the state budget and less towards a policy to increase employment, although Greece recorded a significant number of unemployed people, especially among the young people (58.3% in 2013). It is interesting to note that in 2012 the implicit

tax rate on labour in 14 of the 20 states that regulated the minimum wage is below the European average of 36.1%, which somehow shows their concern for stimulating employment.

Research Methodology

Our econometric approach is based on panel data estimation, with a one-way error component model for the disturbances (Baltagi (2008)). Such a regression model may have the following form:

$$y_{it} = a + X'_{it} b + u_{it} , \, i = 1, ..., N; \; t = 1, ..., T, \text{ with } u_{it} = \alpha_i + \varepsilon_{it} .$$

In this context, the i subscript refers to the countries under investigation, while the t subscript refers to the time period analysed; the α_i component of the error is

the individual effect, and the ε_{it} is the idiosyncratic error.

In this study we only focus on linear panel data models, and in this area there are two

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main models: fixed effects and random effects, based on whether the individual effects are treated as fixed or random. Thus, in the fixed-effects (FE) model, the α_i may be correlated with the x_{it}, continuing to suppose that x_{it} is uncorrelated with the idiosyncratic error ε_{it}, while in the random-effects (RE) model the α_i is purely random and therefore uncorrelated with the regressors (Baum (2001)).

The decision between FE and RE models can be made based on different tests, economic reasons and/or information criteria. Taking into account that we do not have a large sample of countries in order to sustain the possibility that our individual effects be random, and considering the result of the Hausman Test, we decided to estimate a fixed effects model for this particular case.

One of the commonly used methods to exclude the fixed effects is to mean differencing the original equation. The estimator that does exactly this procedure

is called the within estimator. After estimating an FE model, all that is left to check is the properties of the error. The error ε_{it} is assumed to be independent and identically distributed (i.i.d) (Cameron and Trivedi (2009)). In order to check if the errors are autocorrelated and/or homoskedastic, some tests must be performed, because when the errors are autocorrelated and/or heteroskedastic the standard errors of the estimates will be biased and robust standard errors will be needed. These tests are usually implemented in most statistical software packages. Even the corrections of these possible problems are provided (Drukker (2003), Hoechle (2007)).

Econometric Analysis

Going through all the necessary steps in order to achieve robust fixed-effects estimations, we obtained the results in table 1.

Table 1: Empirical results

Fixed effects models		
Models	**Log earnings**	**Employment rate**
Minimum wage (natural logarithm)	+0.635 (18.17)*	-5.307 (2.38)**
GDP (natural logarithm)	+0.242 (4.68)*	+15.318 (3.59)*
Implicit tax (%)	-0.006 (-1.91)***	-0.307 (0.08)*
ISCED 0-2 employment rate (%)	+0.010 (3.73)*	
ISCED 3-4 employment rate (%)	-0.006 (-3.53)*	
cons	-3.142 (-2.74)**	-284.01 (81.24)*

Note: between brackets are the t statistics, and *, ** and *** stands for a 1%, 5% and 10% significance level.

Analysing the econometric results, we notice that the most important factor that influences the monthly net earnings is the minimum wage (coefficient 0.634). This is

primarily due to the fact that by 2010, amid the economic growth, the minimum wage increased continuously in all EU countries that had the minimum wage regulated by

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law. After 2010, the effects of the economic crisis that started in 2008 were fell on the minimum wage as well, so that in most EU countries the minimum wage decreased and the most obvious decrease was suffered by Greece (14% in 2012 compared to 2010).

Compared with the influence of the minimum wage, the GDP impact is much lower (coefficient 0.242), even if GDP is a classical explanatory variable in terms of net earnings growth. Nevertheless, the economic theory related to the correlation between the macroeconomic result and the remuneration of the work production factor is applied.

It can be noticed that the employment rate with a low level of education ISCED 0-2 (secondary education or no education) has a positive influence on net wages (even if it has a coefficient of only 0.01). This shows that during the analysed period there was an increase in the demand for labour, especially for workers with low qualifications who are often paid the minimum wage.

The influence of the employment rate of high school and post-secondary education (ISCED 3-4) is particularly interesting in sign (coefficient -0.0057) because it signals a possible effect of increasing the supply of labour for the period of economic expansion, but also the fact that this category of employees was more affected by the crisis than the category of employees with ISCED 0-2 education. In other words, during the economic boom, the raise of the minimum wage, and hence the earnings, could have encouraged the entry on the labour market of new echelons of labour force with secondary education (since employment was more attractive than any further study) and during the recession these employees were affected by unemployment or salary decreases.

As for the absence in the equation (invalidated by econometric tests) of the workforce with higher education (ISCED 5-6), the explanation could be the fact that during the expansion phase of the economic cycle (inflationary gap) the higher education employment is at the maximum level, and the new entries are given only by graduates, and also this category of employees should have been the most affected by the economic crisis.

The contribution of the implicit taxation is negative (coefficient -0.005) indicating that tax level and work contributions discourage the demand for labour.

The employment rate equation shows a normal dependency between variables, as considering the coefficient signs. The highest influence upon employment rate is generated by the implicit taxation (coefficient -0.307). The impact is negative and normal as long as the level of implicit taxation indicates the share of all taxes on labour in total labour remuneration. Thus, the higher the taxes and contributions are, the lower the level of employment becomes, since the employers are forced to reduce wage fund at the expense of new employment or even by letting employees go.

The economic theory regarding the link between economic growth and employment rate suggests a positive impact on employment (coefficient 0.153). The influence is rather small because it is known that an increase in employment implies more complex and long lasting changes in terms of the overall economic system than a simple increase in GDP.

The minimum wage is another important determinant of employment rates, as shown by the associated coefficient of -0.053. The correlation is basically normal, as it corresponds to the analytical form of the labour demand, especially if we consider the minimum wage as the base of earnings determination for the whole economy. An increase in the minimum wage causes additional expenses at the firm level, which can lead to reduced employment. Thus, the minimum wage policy should be carefully managed by each state so to avoid negative effects upon employment.

Conclusions

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The economic crisis that broke out in 2008 brought into discussion the sustainability and competitiveness of the EU Member States. The labour market has been one of the most affected macro-markets during the recession, especially through national policies on wages, policies that imposed austerity measures in this area. However, the effects of the economic crisis have brought in recent discussions at the European level the minimum wage issue, even if the minimum wage has always been an important pillar of the European Social Model. Thus, it is more often than ever taken into account the possibility of introducing a minimum wage at the European level whose value should be equal to at least 60% of the median wage in each Member State in order to prevent poverty that affects tens of millions of people in the Community area.

From the statistical analysis, we observed that in the analysed period the most significant increases of the minimum wage were recorded in the Central and Eastern European countries, with at least 111%, while at the opposite end the minimum wage grew with only 26.3% in Greece. In most cases, the earnings were higher in 2012, excepting Ireland, Romania and the UK for which the earnings (expressed in 2005 prices) were higher in 2000. Still, much of the increase in this period is due to the economic growth experienced before 2008-2009. The effects of the economic and financial crisis led to a lower economic performance of the EU Member States in the last years (the GDP growth in the EU-28 underwent a substantial deceleration in 2008). Regarding the level of the implicit tax rate on labour, this decreased in most of the EU countries, decrease that is largely caused also by the effects of the economic crisis.

In this context, the analysis we undertook aimed to identify the determinants of the net monthly earnings and employment rate in the European countries, focusing on the influence of the minimum wage. Thus, we found that the minimum wage has the greatest positive impact on earnings, higher even than the influence of the macroeconomic outcome (GDP). We also obtained a positive influence from the employed population with a low level of education (ISCED 0-2) indicating an increase in labour demand for this category of employees during the period analysed. On the other hand, the influence of the employment rate with high school and post-secondary education (ISCED 3-4) on earnings turned out to be negative indicating a possible effect of increase in the workforce supply during the economic expansion period, but also the fact that this category of employees was more affected by the crisis than the category of employees with ISCED 0-2 education. The implicit taxation has a negative impact indicating that tax level and work contributions discourage the demand for labour.

The minimum wage has a negative impact upon the employment rate, as it corresponds to the analytical form of the labour demand. Otherwise, we can say that a minimum wage growth can lead to higher firm expenses and implicitly to lower employment. The highest influence upon employment rate is generated by the implicit taxation, thus, the higher the taxes and contributions are, the lower the level of employment becomes, since the employers are forced to reduce wage fund at the expense of new employment or even by letting employees go. The employment rate is also positively influenced by the GDP, showing a positive and normal correlation.

In recent years, the EU organisations took into discussion more often than not the idea of implementing the regulations establishing a minimum income in the EU countries in order to prevent poverty. However, the minimum wage cannot be unique in Europe, because of the different levels of development of the EU countries, but it is intended to comply with a scale in accordance to the development level of each state. Thus, the minimum wage remains a controversial topic for the labour market policies of the European states.

We believe that this paper is of great value for the research and makes a significant contribution to the minimum wage literature and could be extended by

considering other macroeconomic indicators and also dynamic panel data model.

References

1. Autor, D.H., Manning, A., Smith, C.L. (2010)."The contribution of the minimum wage to US wage inequality over three decades: a reassessment", (No. w16533), *National Bureau of Economic Research.*

2. Baltagi, B.H. (2008) "Econometric Analysis of Panel Data", *John Wiley & Sons Lt.*

3. Baum, C.F. (2001), "Residual diagnostics for cross-section time series regression models", *The Stata Journal*, 1 (1), 101–104.

4. Brown, C., Gilroy, C., Kohen, A. (1982). The Effect of The Minimum Wage on Employment and Unemployment. Journal of Economic Literature, 20(2), 487-528.

5. Cahuc, P., Michel, P. (1996). "Minimum wage unemployment and growth", *European Economic Review*, 40(7), 1463-1482

6. Cameron, AC and Trivedi, PK. (2009), Microeconometrics Using Stata, Stata Press

7. Card, D.,Krueger, A. B. (2000). Minimum wages and employment: a case study of the fast-food industry in New Jersey and Pennsylvania: reply. The American Economic Review, 90(5), 1397-1420.

8. Drukker, DM. (2003), "Testing for serial correlation in linear panel-data models", *The Stata Journal*, 3 (2), 168–177.

9. Fernández-Macías, E., Vacas-Soriano,C. (2013). "A coordinated EU minimum wage policy"*?, Eurofound*

10.Hoechle, D. (2007), „Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence", *The Stata Journal*, 7 (3), 281-312.

11.Herr, H., Kazandziska, M. (2011). "Principles of Minimum Wage Policy: Economics, Institutions and Recommendations*", ILO.*

12.Teulings, C.N. (2003). "The contribution of minimum wages to increasing wage inequality". *The Economic Journal,* 113(490), 801-833.

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