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THE ECONOMIC AND SOCIAL IMPACT OF MINIMUM WAGE

Abstract. *This paper analyzes a matter of concern and of real interest to economists, employers and the political class, on the impact of minimum wage on unemployment and employment rates. The economic theory shows a positive link between the minimum wage and unemployment. The literature, however, shows no sign of a clear result on this relationship. This work aims to study the relevance of this statement for the Romanian economy, using different econometric methods. The article contains multiple models and approachesto test the nature of these dependencies, such as: cluster analysis, conditional correlation, regression estimation, variance decomposition and testing Granger causality using autoregressive vectors.These are complementary and, in the end, help us reach an unanimous conclusion.*

Keywords: *minimum wage, macroeconomic variables, cluster analysis, Granger causality, VAR, conditional correlations.*

JEL classification: C58, E24, E44, J30

1. Introduction

Economic theory teaches us that increasing the minimum wage leads to changes in demand and supply in the labor market, reducing the number of jobs. But, the literature in this domain manages to bring arguments to support both economic theory and analysis that support the opposite. It is expected that such an analysis to generate different results from one country to another, considering a multitude of factors that may or may not validate economic theory, such as: how strong the economy is, what imbalances exist on other markets (as they are all interconnected), and what is the level of development of that country's economy.

In this paper we start by presenting, in the literature review, scientific articles studied on this subject, together with the authors' results and in the methodology we reflect the technical part of this analysis by explaining the models and methods used by great authors, such as Lütkepohl, Toda, Yamamoto, whose worksare still applied and quoted today. Minimum wage is an instrument of the labor market and as it will be shown in the literature review, its effects are not the same from one economy to another. Then, we continue with the case study where we adapt these methods, proposing a thorough analysis of the Romanian market

and also addressing new ways of analysis and getting results in the issue under study. The objective is to have a complex and in depth empirical analysis regarding Romanian minimum wage and its impact on the economy, since there are a few articles on this topic and most of them are very simplistic. Considering this, we performed a cluster analysis in order to group countries, initially, based on the minimum wage, and then also depending on other macroeconomic variables such as GDP, consumption, investment, payroll, unemployment (all expressed as the average over the last 5 years (2010-2014)) and determine in what category does Romania fit in and with what countries it could be compared to.The 20 countries considered were: Belgium, Bulgaria, Czech Republic, Estonia, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, USA, Turkey, Hungary. By determining the economies that Romania is comparable to, it will prove very helpful when estimating the impact that various measures will have on the country's economy, already knowing the influence those measures had on other markets resembling Romania. Analyzing the impact through different methods, that all lead to the same results, and deciding whether the increase in minimum wage has a negative or a positive influence is an important contribution to the existing literature.

2. Literature review

High rates of unemployment are a concern and in order to find possible causes, economists turn their attention to the minimum wage and its effects on the economy. The literature contains numerous studies that have as a main objective testing the existence of any link between the minimum wage and the unemployment rate or the number of hires. But they do not have an unanimous answer on this issue, having plenty of other factors that contribute to determining whether the findings confirm or infirm the economic theory, which states that increases in minimum wage should be reflected in reducing the number of hires, therefore rising unemployment. Most likely to be paid with minimum wage are either unskilled workers or young people, this is why many studies focus on these categories.

In the period 2008-2013, several European countries and the United States increased the minimum wage, the measure being part of their plan for economic recovery after the crisis, intensifying, thus, disputes related to the impact of these increases. **Addison et al (2013)**[1] shows that even in times of recession, the minimum wage does not seem to have a strong effect in rising unemployment in the economic sectors most likely to be affected by this change. However, among young people, who are considered the group with the highest risk of being affected by the wage increase, they found a very weak influence, given by a reduction in the

[1]Addison, J. T., Blackburn, M. L., Cotti, C. D., „Minimum Wage Increases in a Recessionary Environment", *Labour Economics Volume 23, August 2013, Pages 30–39*

number of employees in restaurants. **Marginean and Chenic (2013)**[2] say that the minimum wage is a result of social policy and it is not tied to the real economy, as opposed to the average salary that describes its true evolution. Another aspect that they say in the study is that analysis based on groups of countries may be irrelevant if the countries are not homogeneous; for example, it might not be useful for Romania to be included in a data panel study based on the effect that minimum wage has on young people because the percentage of young people in the workforce is very low and the age they start working is higher than in the US or Canada. The article is concluded with a paradox according to which changes in the minimum wage have an effect on other markets, not just the labor market: if unemployment is not influenced, then the studies should be directed to other markets that may be affected and its effects could be transmitted.

An article highly discussed and cited is that of **Card D. and Krueger A. (1994)**[3] which analyzes, based on questionnaires, the situation of fast-food restaurants, in New Jersey and Pennsylvania before and after increasing the minimum wage from $ 4.25/h to $ 5.05/hour in order to compare the two moments and identify the effects generated by this change in April 1992. The fast food industry was chosen due to the fact that employees are paid mainly with the minimum wage and the fact that these chain stores are homogeneous in terms of products, prices and the requirements for employment. The overall conclusion of this paper is that the authors have shown that increasing the minimum wage has not led to a reduction in employment in the fast food industry. This article is in line with **Schmitt (2013)**[4] who believes that there are other channels that react to the minimum wage increase, identifying the main reasons for not having any effect on employment, namely that in order to cancel the effect of the increase in wage, employers could reduce the working hours, the benefits that are offered, or on the contrary, they could invest in trainings to increase productivity, they could reorganize and make production more efficient, they may increase prices so that the increase in salary is borne by the customer or they could accept a lower profit.

Regarding Romania's situation, there are not many studies that analyze the influence of the minimum wage on unemployment, this being the main objective of our study, which is to fill out this insufficiency that exists in the current literature. One of the few articles regarding minimum wage in Romania is the one by **Andreica M.E., Aparaschivei L., Cristescu A., Cataniciu N. (2010)**[5] which

[2]Marginean S., Chenic A.S., "Effects of Raising Minimum Wage: Theory, Evidence and Future Challenges", *International Economic Conference of Sibiu 2013 Post Crisis Economy: Challenges and Opportunities, IECS 2013, Procedia Economics and Finance 6, 96 – 102, 2013*

[3] Card D., Krueger A., "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania", *American Economic Review, Vol. 84, No. 4, pp. 772-793, September 1994.*

[4]Schmitt J., "Why Does the Minimum Wage Have No Discernible Effect on Employment?", *Center for Economic and Policy Research, February 2013*

[5] Andreica M.E., Aparaschivei L., Cristescu A., Cataniciu N., "Models of the Minimum Wage Impact upon Employment, Wages and Prices: The Romanian Case", *RECENT ADVANCES in MATHEMATICS and COMPUTERS in BUSINESS, ECONOMICS, BIOLOGY & CHEMISTRY, 2010*

focuses on modeling the relationship between the minimum wage and unemployment. The nominal minimum wage is used, the analyzed period being 1991Q1 - 2009Q4. Regressions are estimated using, in turn, as dependent variables: the average wage, the employment rate and consumer price index. A first conclusion is that increasing the growth rate of the minimum wage slows down the growth of the employment rate by 0.9% cumulative from Q1, Q3, Q4, but after estimating a VAR, variance decomposition shows the relative importance of external shocks in explaining the fluctuations in the labor market, showing that only 1.8% of the variation in the employment rate is given by shocking the minimum wage.

Meer J. and West J. (2013)[6] argue that most articles on this topic examine the impact of minimum wages on employment level and not on the employment dynamics, representing the degree of job growth or decrease. They study the period 1975 - 2012 and build a data panel analysis for the US states, using as dependent variable: $\frac{Numberofhires_t + Numberofhires_{t-1}}{Avg(Numberofhires_t; Numberofhires_{t-1})}$, calculated according to the Census Bureau, considering that it will measure better the effect of the minimum wage. The natural logarithm of population of each state is considered a control variable. The authors propose using real values, not nominal, for a better estimation of the impact. If increases in minimum wage show a negative effect on employment dynamics before it is implemented, this demonstrates that the result is caused by other factors. The authors conclude that the effect of minimum wage over the increase in the number of jobs is concentrated in industries that pay minimum wage. Amoung young people it demonstrates that minimum wages reduce the rate of job growth.The assumption that the minimum wage could have a negative impact on employment is also studied by **Majchrowska A. and Zołkiewski Z. (2012)**[7] for the labor market in Poland, for certain regions or groups of workers, using data panel, the studied period being 1999 - 2010. As in Romania, Poland also aims to increase the minimum wage at 50% of the average wage. The article presents the models used more frequently in the literature, having as dependent variable employment and the minimum wage as an independent variable, using control variables, such as GDP, output gap, unemployment rate. An independent variable used in this study is the number of people registered at school, considering that young people would be most affected by minimum wage legislation. However, this article shows that the minimum wage has had an adverse impact on employment in Poland in the period 1999 - 2010 and that between 2005 - 2010 when the minimum wage was the highest, the most affected were young people between 15 and 24. Finally, it suggests the need to implement reforms in

[6]Meer J., West J., "Effects of the Minimum Wage on Employment Dynamics", *NBER Working Paper No. 19262, August 2013*

[7]Majchrowska A. si Zołkiewski Z., "The impact of Minimum Wage on Employment in Poland", *Investigaciones Regionales, 24 – Pages 211 to 239, Section Articles, July 2012*

both the education system and in labor market in order to reduce the negative impact on young people, who are most vulnerable.

3. Methodology

The fundamental aim of this paper is to to thoroughly study the topic related to raising the minimum wage and the influence of these decisions on the economy. The analyzed period is 2000Q1 - 2016Q2, quarterly data, accumulating a total of 66 observations, using the following macroeconomic indicators: the real minimum wage (MINWAGE_REAL), the unemployment rate*(calculated as a ratio between number of unemployed and active population)*, both total (UR_total) and for the youth aged between 15 and 24 years (UR_1524), the employment rate or occupancy rate*(calculated as a ratio between active population minus unemployed and total population)* (ER_1524), with the data source being the National Institute of Statistics and Eurostat. To transform the minimum wage into real values the CPI_{2015} was used. Also, after ADF tests, data was stationarized using the first difference of logarithms, working further with growth rates. By doing so, we ensure that data is uniform and the results will not be skewed by shocks, which are absorbed over time, not being permanent.

For this article we propose a case study starting with the evolution of minimum wage in Romania, following with a qualitative analysis that compares the Romanian economy with that of countries such as: Belgium, Bulgaria, Croatia, Czech Republic, Estonia, France, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, The United Kingdom, in the desire to group Romania with countries that have similar characteristics. Other variables considered, except for the minimum wage, were: GDP, consumption, investment, exports, imports,wages and salaries, compensation of employees, unemployment rate (total and aged 15-24). The aim is that in the future to also track the effects of the increase in minimum wage in countries that are comparable to Romania so that decisions taken within our country to also take into account this aspect. The study culminates with a complex quantitative analysis (regressions, estimation of autoregressive vectors, Granger causality, variance decomposition). VAR analysis for 2 variables involves estimating the following equations, so that each variable has an equation explaining its evolution based on their own lags and the lags of the other variable in the model:

$$\begin{cases} Y_t = \sum_{i=1}^{n} \alpha_i Y_{t-i} + \sum_{j=1}^{n} \beta_j X_{t-j} + u_{1t} \\ X_t = \sum_{i=1}^{n} \gamma_i Y_{t-i} + \sum_{j=1}^{n} \delta_j X_{t-j} + u_{2t} \end{cases}, \quad (1)$$

whereu_{1t} si u_{2t} represent the impulses, the shocks, which are not correlated.

In this case, the notion of causality does not refer to a causality in its true sense, but more to a variable's ability to help predict other variables. The Granger test has the following null hypotheses, their rejection leading to the existence of Granger causality:

$$H_0: \beta_j = 0 \leftrightarrow X \overset{G}{\not\rightarrow} Y$$
$$H_0: \gamma_i = 0 \leftrightarrow X \overset{G}{\not\rightarrow} Y$$

In our quantitative analysis we also estimated a dynamic correlation between minimum wage and employment rate (for ages 15-24) using the method of estimation ARCH Maximum Likelihood, based on a VECH model with the following specifications:

*GARCH = M + A1.*RESID(-1)*RESID(-1)' + D1.*(RESID(-1)*(RESID(-1)<0))*(RESID(-1)*(RESID(-1)<0))'D1.*(RESID(-1)*(RESID(-1)<0))*(RESID(-1)*(RESID(-1)<0))' + B1.*GARCH(-1), (Table A, Appendix)* (2)

where:

M is a scalar
A1 is a diagonal matrix
D1 is a scalar
B1 is an indefinite matrix

As it proved impossible to estimate a dynamic correlation between minimum wage and unemployment rate that would have all the coefficients significant, we succeeded in estimating one between the minimum wage (for which we applied a 20% shock on the growth rate starting with year 2011, after the 2 year stagnation) and the unemployment rate for youth. The VECH model has the following specifications:

*GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1) ,*
(TableB, Appendix) (3)

where:

M is a scalar
A1 is a diagonal matrix
B1 is a scalar

It is necessary that all the system's coefficients are significant in order to determine the conditional correlations. Such a correlation, unlike the static one determined by Pearson coefficients, has the advantage of capturing the correlations evolution over the entire period, providing one value in every moment, to better analyze the link between the variables.

Regressions were also estimated, having the minimum wage as an exogenous variable. These were validated by performing coefficient test (so that they are statistically significant), tests for residuals (checking if they are autocorrelated, homoskedastic or heteroskedastic and whether they follow a normal distribution).Granger causality was performed under VAR as the traditional one has certain limitations, such as the fact that it does not take into account whether or not the variables are stationary or cointegrated.These can lead to specification errors, false regressions; therefore, we use an improved procedure to test Granger causality. As far as the analysis based on a vector autoregression is concerned, the main articles that were the basis of this study were: Lütkepohl, Dolado, Toda and

Yamamoto. A series is integrated of order d, I(d), if the stochastic trend is eliminated by differentiating the respective variable "d" times. Cointegration occurs in situations where in a set of integrated variables of order „d" there is a linear combination that has an integration order less than „d", in which case the variables have a common trend component. Although they are integrated, a linear combination of them can be stationary.[8] According to **Kestel (2013)**[9] if the variables at level are I(0), then it is recommended to use a VAR at level, but if the variables at level are I(d), with „d" greater than 0, then if they are cointegrated a VECM at level should be used, and if they are not stationary and are not cointegrated, it is necessary to apply first difference, and after that the variables can be used in a VAR. What Toda, Yamamoto, Dolado and Lütkepohl succeded to show is that a VAR at level can be estimated without knowing in advance which is the order of integration, if the variables are cointegrated, thus avoiding possible errors caused by pre-testing in order to determine such information. The ultimate goal is to determine whether or not there is Granger causality and if so, which is the direction of this causality. This will be determined using the Wald test applied to a VAR. But, if the considered variables are integrated or cointegrated then the Wald test may have nonstandard asymptotic properties. In order to have an asymptotic standard χ^2 distribution, **Dolado and Lütkepohl (1996)**[10] consider the cointegration structure of the system unknown and propose the estimation of a VAR with a higher order than its real one, VAR(p+1), where p is the actual number of lags determined using information criteria and applying the test only for the first "p" lags. They have proven that if the VAR has a small number of variables and a large number of lags, as in the case of this article, this reduces inefficiency caused by the introduction of yet another lag. As opposed to if the VAR has many variables and the number of lags (p) is small (≤ 2), then this increases inefficiency. This idea is also in line with **Toda and Yamamoto (1995)**[11] who estimate a VAR($k+d_{max}$), where "k" is the optimal number of lags, d_{max} is the maximum order of cointegration, which they assume to be 2. This method, although it is an over parameterization of the VAR, the degrees of freedom do not change with the increase in the number of lags, provided that $d_{max} \leq k$. It is important to note that, in general, for VAR analysis, with the exception of the causality test, the first difference of the variable should be used if the variables are I(1), but not cointegrated (in this case, having to use VECM).

[8] Lütkepohl H., "Vector Autoregressive Models", *EUI Working Paper ECO 2011/30*

[9] Kestel S., "Vector autoregressive - VAR Models and Cointegration Analysis", 2013 (*https://www.empiwifo.uni-freiburg.de/lehre-teaching-1/summer-term-13/Material%20Time%20Series%20Analysis/var13.pdf)*

[10] Dolado J., Lütkepohl H., "Making Wald Tests Work for Cointegrated VAR Systems", *Econometric Reviews, 15(4), 369-386,* 1996

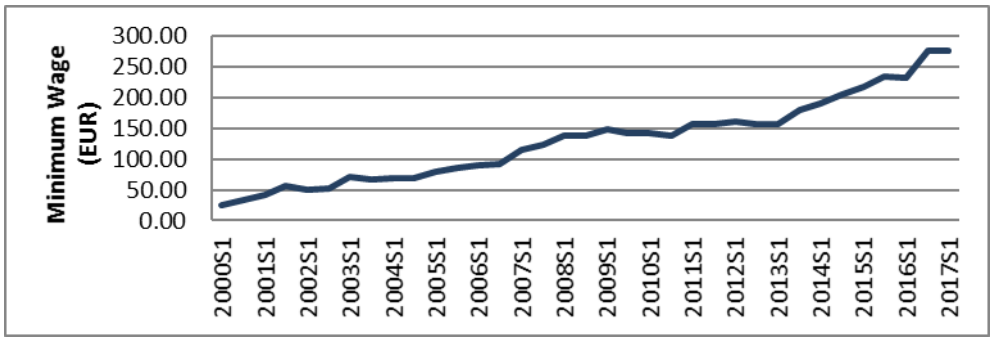
[11] Toda H., Yamamoto T., „Statistical inference in vector autoregressions with possibly integrated processes", *Journal of Econometrics 66, 225-250,* 1995

4. Results

4.1. The Evolution of Minimum Wage in Romania and Comparisons with Other Countries in the European Union

The graph below presents the evolution of the minimum wage in Romania, the nominal minimum wage being represented together with the real salary to illustrate that the use of nominal values in the analysis could lead to erroneous results since there were times with high inflation during the analysed period.

Figure 1: Minimum Wage Evolution Romania 2000 - 2017

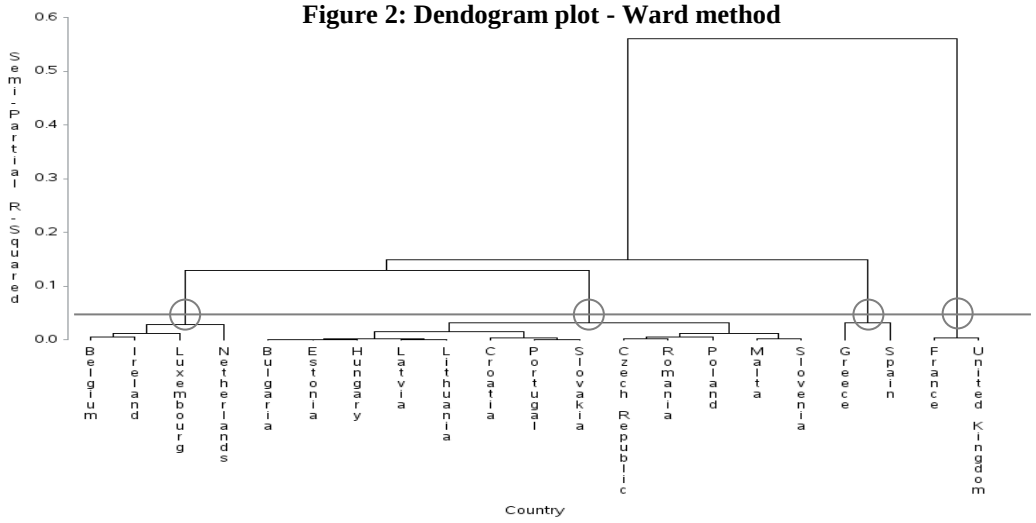


Source: Eurostat

As it can be seen in the graph above the evolution of the minimum wage took a faster pace starting with 2013, doubling its value in the following 4 years. This rapid growth rhythm came after a stagnation at around 150€ between 2008 - 2012, due to the financial crisis. Starting with the 1st of February 2017, an employee paid with the minimum wage will be granted a salary of about 322€, for which an employer must allocate 395€, leading the employee cashing a net salary of about 236€.

A cluster analysis was performed in order to group 21 countries in the European Union by taking into account 10 macroeconomic variables: minimum wage, GDP, consumption, investment, exports, imports, wages and salaries, compensation of employees, unemployment rate (total and aged 15-24), using an average over the period 2010 - 2016. The purpose of this analysis was to find countries that are comparable to Romania, in term of these variables considered. For choosing the number of clusters, both the CCC and the Pseudo-F criteria suggested 4 clusters, as following:

Figure 2: Dendogram plot - Ward method



Source: Eurostat, data process SAS 9.3

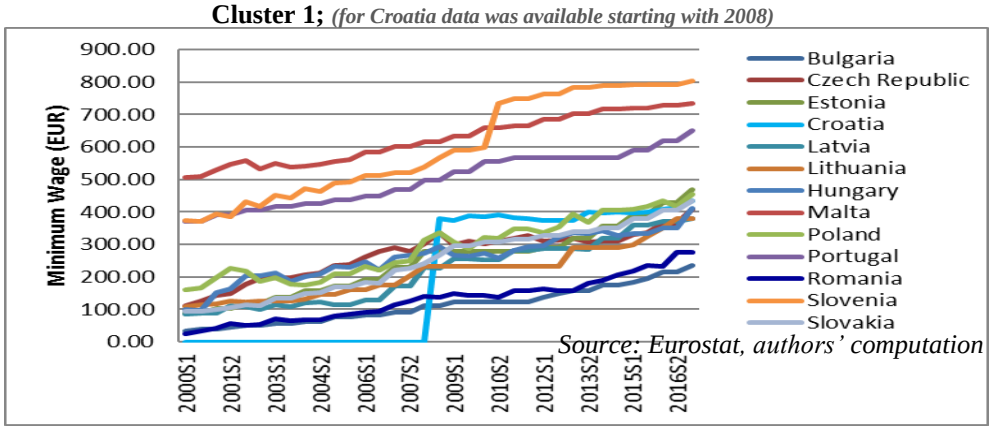
Table 1: Countries divided by clusters

Cluster 1	Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia
Cluster 2	France, UK
Cluster 3	Belgium, Ireland, Luxembourg, The Netherlands
Cluster 4	Greece, Spain

Source: SAS

Having the information of the countries that have an economy similar to Romania proved to be useful both in choosing the articles to study for this research, as the Romanian literature on the subject is not vast, and in taking just the countries in Cluster 1 and treating them as a homogeneous group. As it can be seen, from the graph below, Romania has one of the lowest minimum wages out of the analyzed countries, after Bulgaria. The first three countries differentiate themselves from the others: Slovenia (with the highest increase of more than 20% from S1 to S2 of the same year), followed by Malta and Portugal.

Figure 3: Minimum Wage Evolution - comparison between countries in Cluster 1; ***(for Croatia data was available starting with 2008)***



Source: Eurostat, authors' computation

Slovenia is an interesting case, as the entering into force of the Minimum Wage Act in March 2010 increased the statutory minimum wage with 22.9%. Studies of this matter show that this legislative change impacted the most the young and low-skilled workers, but it also had spillover effects on the wages that are higher in the wage distribution. In this case,an increase in minimum wage in such a short amount of time led to reduced employmentand it was also shown that despite this increase there was still no incentive to restart working, as the people who were unemployed prefered to continue receiving unemployment benefits.

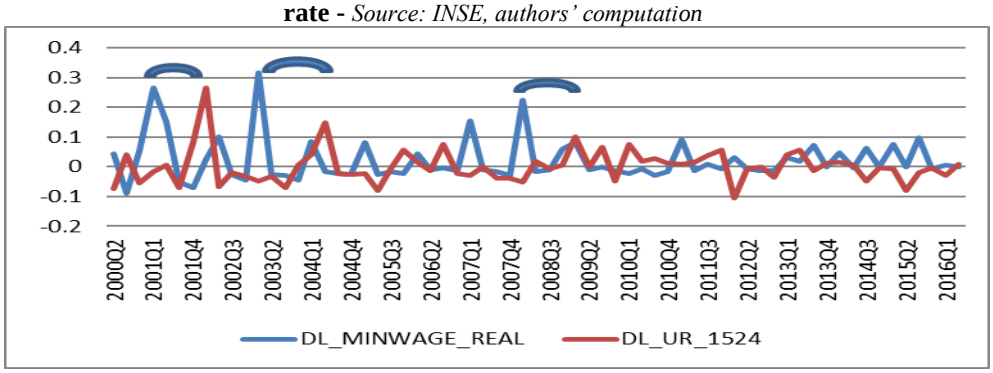
Having this in mind and also knowing that Romania is in the same cluster as Slovenia may be an example of what not to pursue in terms of increasing the minimum wage so abruptly as it could lead to the same negative effects as for Slovenia.

4.2. Dynamic Correlations: Real Minimum Wage - Unemployment Rate (15-24)

Connection between Real Minimum Wage and Unemployment Rate (Employment Rate, respectively)

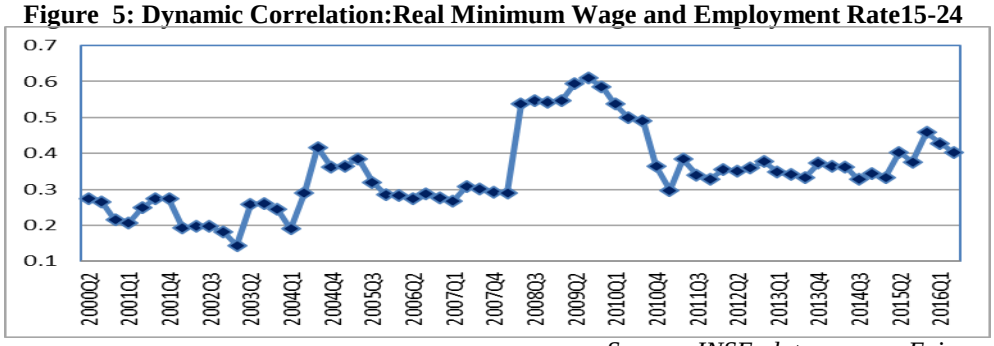
Analyzing the evolution of growth rates for the minimum wage and unemployment rate, we might be inclined to say that an increase in the growth rate of the minimum wage could lead to an increase in the rate of unemployment, with a lag of 4 cycles, looking at the highest peaks in the minimum wage evolution and seeing that there are patterns in the evolution of the minimum wage that are approximately repeated in the evolution of youth unemployment rate (first two peaks in the graphic below) and some patterns that are similar, but with lower intensity (for example, second and third group of peaks):

Figure 4: Evolution of growth rates for the minimum wage and the unemployment rate - *Source: INSE, authors' computation*



In order to track the connection between the real minimum wage and the unemployment rate for young people between 15 and 24 years in every moment of the analysis and to determine the nature of this link, it was necessary to estimate dynamic correlations using a diagonal VECH model. As this proved to not be significant obtaining probabilities much higher than 5%, we also estimated the dynamic correlations using the employment rate, resulting in the following:

Figure 5: Dynamic Correlation:Real Minimum Wage and Employment Rate15-24

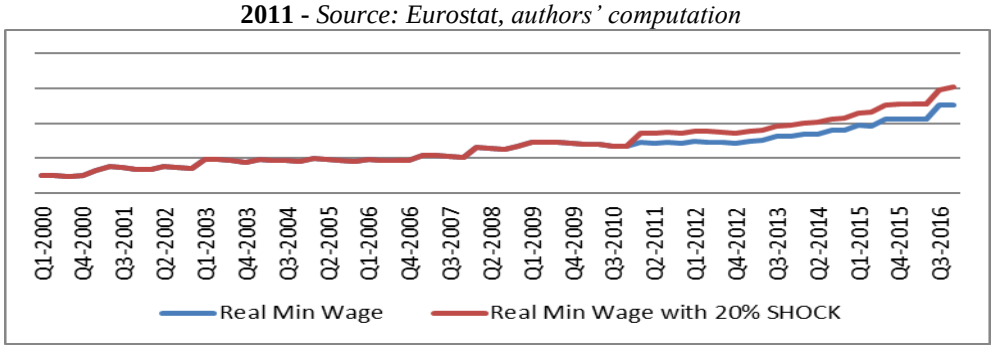


Source: INSE, data process Eviews

Our first observation, considering the above graph would be that thecorrelation is positive for the entired analyzed period, so that we can say that the increase in minimum wage can not have any negative effects on the evolution of the employment rate. Secondly, the correlation coefficients are mostly below 0.4 which is considered as a low correlation. The main exception is for the period 2008Q2 - 2010Q3, time in which the financial crisis affected our economy, which is why we consider the high correlation for this period inconclusive as it may have been caused by external factors.

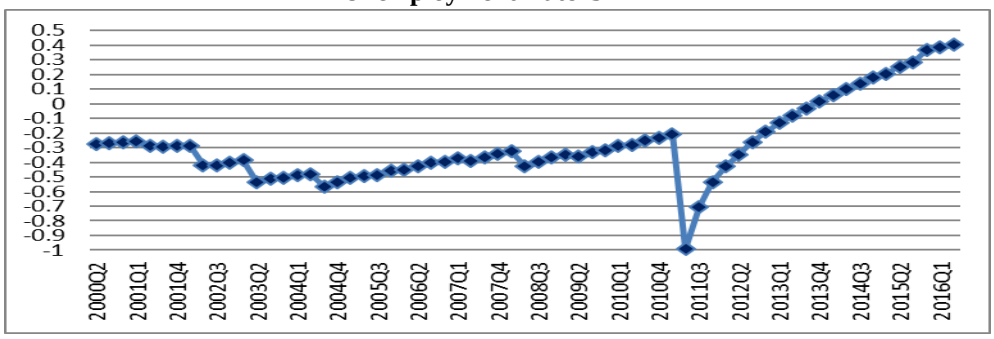
Due to the financial crisis the value of the minimum wage was held constant in 2009 and 2010. In order to test whether the situation of Slovenia, of a high increase in minumum wage from one year to another leading to high unemployment rates, could also have the same impact on the Romanian market, we considered a 20% shock in the growth rate of minimum wage starting with 2011 and then followed the same trend as the actual data:

Figure 6: Applying a 20% shock to the growth rate of Minimum Wage from 2011 - *Source: Eurostat, authors' computation*



The resulting dynamic correlation between unemployment rate for youth and the minimum wage with shock is the following:

Figure 7: Dynamic Correlation: Real Minimum Wage(with 20% shock) and Unemployment Rate15-24



Source: INSE, data process Eviews

It is interesting to see how starting with year 2000 and up until end of 2010 the correlation was entirely negative between the minimum wage and the unemployment rate, with mainly low correlation values. However, the next period after the minimum wage was increased with 20% (similar to the increase in Slovenia's case) the correlation coefficient dropped to nearly -1, point from which it continued to grow. This abrupt decrease can be explained by the fact that there is a lag of 1 period between the 2 variables. Another possibility that should not be ignored is that this correlation becomes positive after the financial crisis, after which firms went bankrupt and jobs were lost, meaning that the abrupt increase in minimum wage may not have been the only trigger in turning this correlation from negative to positive.

To determine the nature of the relationship between these variables a Granger causality test was performed between real minimum wage and the employment rate (both overall and for youth) and unemployment (overall and related to youth 15-24 years). Fulfilling the conditions of vector autoregression stability and the inexistence of serial correlation, the only tests that were kept was the one between the real minimum wage and the employment rate of young people and that between the minimum wage real and total unemployment. However, the only relevant result is that the minimum wage does not Granger cause the employment rate for young people. According to the methodology, if no matter how much "p"(the number of lags) increases, serial correlation would still exist, then it means that Granger causality cannot be tested using that VAR.

Table 2: Granger Causality*(VAR)*: Testing the Granger causality between Real Minimum Wageand the Employment Rate (15-24)

Dependent variable: ER_1524_SA			
Excluded	Chi-sq	df	Prob.
MINWAGE_REAL	28.53235	9	**0.0008**

All	28.53235	9	**0.0008**
Dependent variable: MINWAGE_REAL			
Excluded	Chi-sq	df	Prob.
ER_1524_SA	2.847463	9	0.9700
All	2.847463	9	0.9700

Source: INSE, data process Eviews

The Wald test results in the above table show that historical values of the real minimum wage contain information that could help predict the employment rate of young people.Also, an important aspect is that the motivation of young people to get a job increases due to the increase in the minimum wage and the minimum wage increase is not felt as strongly in the firms' behavior to reduce the total number of employers, and so increase the unemployment rate. This is also supported by the fact that the Granger causality was also tested between minimum wage and unemployment rate and it was not significant.Proving the existence of causality, means we can identify when a minimum wage increase could lead to a move in the same direction in the employmentrate, but mostly it reflects whether or not historical values of one variable can help predict future values of the one that it is Granger causing. However, estimating regressions could provide more information regarding the relationship between the two variables:

Table 3: The Influence of the Minimum Wage on Youth Employment Rate

Equation: Dependent variable: DL_ER_1524

	Independent variable	Coefficient	Std. Error	t-Stat	Prob.
Eq.1					
Adj.R^2:16%	DL_MINWAGE_REAL	0.2376	0.0243	9.7887	0.0000
	C	-0.0109	0.0011	-9.6695	0.0000
	MA(4)	-0.9183	0.0300	-30.595	0.0000
Eq.2	DL_MINWAGE_REAL(-4)	0.2032	0.0680	2.9860	0.0041
Adj.R^2:12%	C	-0.0122	0.0053	-2.3201	0.0238

Source: INSE, data process Eviews

The first equation is an improvement of the first in terms of the value of the DW coefficient. In both cases the growth rate of real minimum wage, whether current or lagged with 4 periods, positively influences the growth of the employmentrate for youth. The employment rate decreased during the stagnation period of the minimum wage, proving that other economic factors are involved, this also being accentuated by a very small Adjusted R-square (12% and 16%). Regarding the relationship between the real minimum wage and unemployment rate we did not achieve statistically significant results, because not all conditions were met: both in terms of regressions, and in the estimation of vector autoregression; errors were heteroskedastic and there was autocorrelation.

5. Discussions, conclusions and further research

This analysis aimed to determine the sign of the link between unemployment, employment rate and the real minimum wage, quantifying its impact on them. This matter was treated from many angles: we studied the evolution of the minimum wage from 1996 to 2016, we performed a cluster analysis with the aim of grouping Romania with other countries in terms of the macroeconomic similarities between them so that the decisions to be taken in Romania also consider how the same decisions or similar ones have impacted these countries.Another useful aspect of the cluster analysis was that, after seeing which are the countries that Romania is similar to in terms of the economic variables considered in this case, we included in the literature review studies from those countries (such as Poland), since the literature in Romania regarding the impact of minimum wage on the economy is very limited and we also aknowledged the negative effects its abrupt increase had on the Slovenian labour market. It resulted that Romania is comparable to 13 of the 21 countries analyzed, such as Czech Republic, Slovenia, Poland, Hungary, Malta, Latvia, Lithuania. Also, dynamic correlations were estimated between minimum wage and unemployment for young people aged between 15-24 years, showing that there is not a clear connection between the two variables, the rise in unemployment being caused by external factors, results which are proven both by Granger causality and the regressions, not leading to any significant results. These are also supported by the articles regarding Romania's case, that were cited in this study: the fact that mostly the external shocks are causing the fluctuations in the labour market.However, regarding occupancy, the rate of growth in real minimum wages positively influences the increase in youth employment rate.A dynamic correlation was estimated also between the minimum wage and the youth employment rate and the results show that it is indeed a positive relationship between the 2 variables, but the correlation is above 0.4 predominantly in the financial crisis period.

An increase in real minimum wage can be beneficial as long as it is not exaggerated, it is not implemented at a fast pace and in a short amount of time and while it is or can be sustainable. In order to sustain this and also test what would have been the influence, of a 20% increasein the minimum wage, on the unemployment rate*(as the case of Slovenia, a country for which it was proved in this article to be similar to Romania in terms of the macroeconomic variables analyzed)* we performed a dynamic correlation between these 2 variables;however, we applied a 20% shock in the growth rate of the minimum wage, starting from year 2011, and the results are very important as they show a sudden decrease in the correlation coefficients to nearly -1, proving once more the negative impact that such an extreme decission can lead to if the sustainability is not carefully analyzed. As the ratio between the minimum wage and the average wage increases, thus, decreasing the gap between the two variables, this can lead to imbalances in the market causing inequity, with no clear differentiation between an unskilled worker or a young one paid with minimum wage and the persons with higher education. For the same reasons, with the increase in minimum wage, many employers are

forced to increase wages of those who are not paid with the minimum wage in order to differentiate between employees. In addition, the increase in minimum wage brings with it increase in taxes and contributions, so it is more likely to have tax evasion. It is necessary that the decission of increasing the minimum wage to be made complementary with fiscal measures, such as reducing taxes on labor so that this increase would be truly "tangible" and workers could actually benefit from it and be more inclined to give up the unemployment benefits and accept a minimum wage paid job. An efficient increase of the minimum wage should take into account the evolution of macroeconomic indicators such as, economic growth, productivity and be closely related to the state of the economic environment. This is what we are planning to include in a new study in which to analyze the impact that minimum wage increase has on GDP, productivity and industrial production.

Appendix

Table A:

Covariance specification: Diagonal VECH

*GARCH = M + A1.*RESID(-1)*RESID(-1)' + D1.*(RESID(-1)*(RESID(-1)<0))*
**(RESID(-1)*(RESID(-1)<0))'D1.*(RESID(-1)*(RESID(-1)<0))*(RESID(*
-1)(RESID(-1)<0))' + B1.*GARCH(-1)*, where:

M is a scalar; D1 is a scalar

A1 is a diagonal matrix

B1 is an indefinite matrix

		Tranformed Variance Coefficients		
	Coefficient	Std. Error	z-Statistic	Prob.
M	1.80E-05	8.09E-06	2.229857	0.0258
A1(1,1)	-0.089886	8.61E-08	-1043685.	0.0000
A1(2,2)	-0.028941	0.005680	-5.095325	0.0000
D1	-0.137786	0.025308	-5.444299	0.0000
B1(1,1)	1.110120	2.94E-06	377383.4	0.0000
B1(1,2)	1.035119	0.015907	65.07323	0.0000
B1(2,2)	1.103881	0.010315	107.0173	0.0000

Table B:

Covariance specification: Diagonal VECH

*GARCH = M + A1.*RESID(-1)*RESID(-1)' + B1.*GARCH(-1)*, where:

M is a scalar

A1 is a diagonal matrix

B1 is a scalar

		Tranformed Variance Coefficients		
	Coefficient	Std. Error	z-Statistic	Prob.
M	5.95E-05	1.75E-05	3.403144	0.0007
A1(1,1)	-0.048523	0.009357	-5.185645	0.0000
A1(2,2)	-0.036244	0.009649	-3.756369	0.0002
B1	1.019211	0.011438	89.10521	0.0000

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