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Between Benefits and Risks for Sustainable Economic Growth: Minimum Wage's Impact on Youth Unemployment Across Five CEE Countries

Viorela Denisa Stroe ¹, Daria Elisa Vuc ^{1,*} , Marius Cristian Pană ² , Mina Fanea-Ivanovici ²  and Robert Maftei ³

¹ Doctoral School of Economics I, Faculty of Theoretical and Applied Economics, The Bucharest University of Economic Studies, 010374 Bucharest, Romania; denisa.stroe@economie.ase.ro

² Faculty of Theoretical and Applied Economics, The Bucharest University of Economic Studies, 010374 Bucharest, Romania; marius.pana@economie.ase.ro (M.C.P.); mina.ivanovici@economie.ase.ro (M.F.-I.)

³ Institute of Business Administration from the Municipality of Bucharest, Asebus Business School, 012101 Bucharest, Romania; robertmaftei@yahoo.com

* Correspondence: daria.vuc@economie.ase.ro

Abstract

Minimum wage changes have long influenced labour market debates, raising interest in their effects on youth workers and on policies that aim to reduce wage disparities while fostering sustainable economic growth. This article examines the relationship between minimum wage adjustments and youth unemployment in five CEE countries: Bulgaria, Hungary, Poland, Romania and Slovakia. Institutional arrangements related to the minimum wage are complex and the study outlines both potential benefits and risks for inexperienced employees. A fixed-effects panel regression over 2010–2024 is employed, with the econometric model implemented in Python (version 3.11) to assess the impact of minimum wage increases on youth unemployment. The variables considered are minimum wage levels, youth unemployment, labour productivity, inflation, GDP per capita and NEET rate. The results reveal a positive and statistically significant relationship, suggesting a trade-off between higher minimum wages and youth opportunities in the region. However, the impact varies depending on each country's institutional context. Moreover, market-oriented policies and inclusive institutions are essential for achieving a sustainable balance between income protection and employment opportunities. Overall, the article contributes to developing context-specific labour market policies within the framework of sustainable development, stressing the importance of wage-setting institutions in promoting resilient and inclusive employment.

Keywords: minimum wage; youth unemployment; labour market; panel data; sustainable development



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1. Introduction

In contemporary society, debates concerning the impact of the minimum wage have gained increasing relevance, given their profound implications for labour markets and sustainable development goals [1,2]. Efforts to reduce wage disparities and promote the inclusion of vulnerable groups in the labour market have intensified within European policy decision makers in recent years. Among the primary tools used to achieve these goals is the statutory minimum wage, however, its actual effects on labour markets remain highly contested [3,4].

The dichotomy in scholarly literature reflects the confrontation between two major schools of thought: the traditional neoclassical approach and the modern perspective. The former argues that setting a minimum wage above the market equilibrium constitutes an artificial wage floor, leading to reduced labour demand and increased unemployment. These negative consequences are disproportionately felt by low-productivity or low-skilled workers, particularly by young individuals entering the labour market [5]. Empirical studies and meta-analyses [3,6] have identified modest, but negative effects on employment levels. Moreover, the role of institutional context is significant, as labour market rigidities can exacerbate the vulnerability of these groups. Through the imposition of uniform wage policies, young people face difficulties in compensating for their lack of experience by accepting lower wages [5]. This structural barrier limits their access to employment opportunities and increases their risk of labour market exclusion [7].

In contrast, contemporary literature, referred to as the “new minimum wage economics”, has challenged the inevitability of negative employment effects. This paradigm shift was catalyzed by the seminal study of Card and Krueger [8,9], which found no evidence that raising the minimum wage led to a decline in employment in the sector under analysis. This modern perspective departs from the model of perfect competition, revising its core assumptions and introducing alternative frameworks such as monopsonistic models or those emphasizing labour market frictions [10]. These models suggest that, within a regulated institutional environment, minimum wage can adjust structural imperfections in the labour market and support increased employment and productivity among vulnerable groups. Institutionalist approaches have emphasized the importance of national factors, such as robustness of the social protection system, the role of collective bargaining and the effectiveness of labour market integration policies, which can amplify the benefits or exacerbate the risks of social exclusion [11,12].

These contrasting theoretical perspectives are particularly relevant in the context of Central and Eastern European (CEE) countries, where labour markets are characterized by high youth unemployment rates, institutional instability and limited collective bargaining coverage [13]. Youth aged 15 to 24 represent one of the most vulnerable groups to labour market shifts, serving as a sensitive barometer of social cohesion and the effectiveness of public policies [14]. Existing studies from the region offer an unclear and contradictory picture of the effects of minimum wage increases, identifying mild or insignificant negative effects [15–17] while others suggest that well-calibrated wage policies can support labour market integration [18,19]. This underscores the need for in-depth comparative research examining the relationship between labour market dynamics and wage policies, with a particular focus on the youth segment.

2. Literature Review

The minimum wage debate, a central element of labour market policy, has been recently reinvigorated and formalized at the European Union (EU) level through Directive (EU) 2022/2041 [20]. This directive establishes a framework for ensuring the adequacy of national minimum wages, suggesting indicative reference values such as 60% of the gross median wage and 50% of the gross average wage [20]. While not legally binding, these thresholds represent a strong normative benchmark for member states, intended to promote collective bargaining and ensure that statutory minimum wages are set at an adequate level. Nevertheless, the actual impact of meeting these benchmarks has generated intense debate and the literature captures this complexity through divergent theoretical perspectives and empirical findings that are often inconsistent [4,21].

The traditional neoclassical approach revolves around the concept of competitive equilibrium in the labour market, where the free interaction between labour supply and

demand determines the wage level. Within this framework, setting a minimum wage above the market-clearing levels leads to an excess supply of labour and a reduction in labour demand. This perspective highlights the potential negative consequences of minimum wage legislation, particularly for young workers or with low productivity, who are more exposed to the risk of labour market exclusion [5,22]. This view is supported by influential empirical studies and meta-analyses, which identify a disemployment effect, albeit of a small magnitude [3,23]. Accordingly, within simple neoclassical models, minimum wage interventions are often regarded as inefficient or even harmful to vulnerable groups. However, this approach has been widely criticized for its limitations, particularly its neglect of institutional and behavioural dimensions of modern labour markets. Such omissions have prompted the development of alternative theoretical perspectives, aimed at providing a more comprehensive understanding of the consequences of minimum wage policies [4,8].

In contrast, the monopsonistic perspective is grounded in the assumption of a labour market characterized by imperfect competition, offering an alternative theoretical framework to the inevitability of negative employment effects. Therefore, introducing or raising the minimum wage may generate positive effects. When minimum wages are set below the marginal productivity threshold, they can counteract the monopsonistic power of employers, aligning wages closer to the actual value of workers' productivity. This adjustment can stimulate labour supply by attracting individuals who were previously unwilling to accept lower wages, potentially leading, paradoxically, to both higher wages and increased employment [10]. This perspective has been supported by extensive quasi-experimental studies, such as the seminal research by Card and Krueger [8,9], which did not detect disemployment effects after minimum wage increases in the fast-food industry, thereby contradicting the predictions of the competitive model. From this standpoint, the minimum wage becomes a policy instrument capable of correcting market failures, enhancing both allocative efficiency and social equity.

Beyond the two dominant microeconomic frameworks, the macroeconomic perspective, rooted in Keynesian theory, complements the theoretical foundation concerning minimum wage policies. This view treats the minimum wage as an income policy tool with a redistributive role, focusing on its impact on aggregate demand. Low-income workers typically exhibit a higher marginal propensity to consume and raising the minimum wage can stimulate domestic consumption [24,25]. As a result, wage increases for vulnerable groups may generate a multiplier effect, encouraging firms to expand production and potentially hire more workers [26]. However, the final impact on employment is considered ex-ante ambiguous, depending on a complex trade-off: while increased demand may foster job creation, higher labour costs could also discourage hiring [21]. Moreover, in economies with structural rigidities, minimum wage hikes may generate inflationary pressures, thus affecting workers' real earnings [27,28].

This perspective adds nuance to the analysis by acknowledging the institutional and economic context in which minimum wage effects unfold. It also emphasizes the importance of incorporating macroeconomic control variables, such as GDP growth or labour productivity trends, into empirical models that aim to estimate the impact of minimum wage policies.

2.1. Beyond Employment Effects: Minimum Wage, Inequality and Social Protection

The minimum wage is not merely a numerical threshold; it also carries a profound social function, designed to ensure the protection of vulnerable groups and reduce wage disparities [29,30]. Recent literature increasingly emphasizes its role in fighting poverty and income inequality. The conceptual evolution of the minimum wage reflects a trajectory that began with the aim of covering basic needs, expanded toward guaranteeing a decent living

and eventually included broader objectives related to social protection for workers. In some countries, this trajectory is closely tied to social security systems, where the minimum wage acts as a social floor intended to mitigate inequalities within the labour market [31].

Nevertheless, the effectiveness of the minimum wage in reducing inequality largely depends on the level at which it is set. A minimum wage that is too low may fail to meet its redistributive goals, while one that is too high may trigger inflationary pressures and job losses [21,32]. Thus, minimum wage policies must be carefully calibrated, taking into account the broader economic context. Moreover, the positive effects of minimum wages are closely linked to the structure of the labour market and the efficiency of complementary support measures, such as investments in human capital and the complexity of active labour market policies [29,33].

To summarize, the minimum wage can serve as an effective instrument for reducing social inequality, but its impact varies significantly depending on the level at which it is established, its coverage in the formal sector and its integration into a broader framework of social and economic policies. In the absence of such a framework, the positive effects on equity risk being limited or even reversed.

2.2. Distributive Effects: The Role of the Minimum Wage in Preventing Inequality

The economic literature emphasizes the role of the minimum wage as an instrument for income redistribution. The social protection measure aims both to ensure a minimum standard of living for low-paid workers and to reduce disparities by correcting imbalances in the primary income distribution [29,30]. The pre-distributive approach has gained traction in recent decades, proposing direct interventions in the primary distribution of income [34,35]. The minimum wage is considered an essential tool for addressing wage imbalances, capable of reducing income disparities, stimulating domestic consumption and improving workers' living conditions [36]. Moreover, minimum wage policies may help reduce gender inequality and strengthen social cohesion [37,38].

This redistributive function incorporates both the Keynesian view, which treats minimum wage increases as a means of boosting aggregate demand [24], and more recent approaches focused on pre-distribution [34,35]. The minimum wage reduces the need for ex-post labour market interventions through taxes and transfers by supporting ex-ante measures [35,39], especially in economies with limited collective bargaining coverage [12,40].

Empirical evidence supports the view that the minimum wage reduces inequality without significantly affecting employment levels [8,29]. Recent meta-analyses highlight its positive effects on income distribution, particularly among low-skilled workers [4,32]. In Europe, a study by Garnero et al. [41] based on 18 EU member states, found that reductions in the relative value of statutory minimum wages led to increased wage inequality, without substantial negative effects on overall employment.

Within this framework, the minimum wage functions as an anchor against the excessive growth of inequality [4,30]. At the European level, this view is reflected in Directive (EU) 2022/2041 on adequate minimum wages, which emphasizes strengthening social dialogue and establishing links between minimum wages and average or median income indicators [20,42]. However, the transnational dimension of inequality remains insufficiently explored in the economic literature, a research gap identified by recent studies using pan-European data [43,44].

2.3. Minimum Wage, Youth and Sustainable Development Goal (SDG) 8

Sustainable Development Goal 8, as outlined in the United Nations 2030 Agenda, aims to “promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all” [1].

A priority target group in this context is young people, who are disproportionately affected by unemployment, informal work and occupational instability [14,45]. Thus, the minimum wage plays a crucial role in achieving the targets of this goal, particularly for workers at the early stages of their careers [30,46].

Young people are the group most exposed to the risks of labour market exclusion, in the European context, the unemployment rate for this age group is more than twice the general average in several member states [47]. This reality has become a significant challenge for ensuring social sustainability [14], as long-term youth unemployment can lead to skill depreciation, weakened social cohesion and a potential “scarring effect” [7,48].

The minimum wage directly influences this challenge by shaping firms’ decisions to hire young people. A guaranteed remuneration level discourages exploitation and precarious work and supports the promotion of sustainable labour market integration [30,36]. However, the economic literature highlights the risks of a high minimum wage that is not aligned with productivity, potentially becoming a barrier to labour market entry. Young people with limited experience or those working in low value-added sectors may be excluded as a result [5,21]. In countries where the minimum wage is high relative to the median wage, the risk of youth unemployment tends to be greater; nevertheless, this negative impact can be mitigated through active labour market policies that support a more sustainable integration into the workforce, such as training and apprenticeships [48,49].

Within the framework of SDG 8.5, which aims to ensure decent work and equal pay for vulnerable groups by 2030, the minimum wage becomes crucial in reducing in-work poverty. The established minimum remuneration threshold is intended to fight poverty among the employed and ensure a decent standard of living, a key issue for youth active in sectors such as seasonal agriculture, retail or services [50,51]. This challenge is not limited to achieving an immediate numerical income target, but it concerns the creation of the necessary conditions for a sustainable livelihood and long-term economic independence. Therefore, a sustainable minimum wage policy should focus not only on addressing basic living needs, but also on supporting employment and the economic viability of the sectors that employ young people [30,52].

2.4. The NEET Phenomenon

SDG Target 8.6 aims to reduce the proportion of youth not in employment, education, or training (NEET), thus acknowledging the difficulty and vulnerability of the transition from education to the labour market [1,53]. The minimum wage serves as a threshold of economic security that can support the formal labour market integration of young people [30,36].

Furthermore, the effectiveness of minimum wage policies depends on the coherence of active labour market policies and support measures that facilitate youth transitions, including career counselling and the establishment of genuine social dialogue. The absence of such policies can become a barrier to youth integration into the labour market, especially for those with limited skills and qualifications [48,54].

2.5. Research Gap and Contribution

Despite the extensive theoretical and empirical debate on wage policies, significant gaps remain in the literature regarding the Central and Eastern European (CEE) region. First, most existing analyses focus on advanced Western economies, while empirical studies on CEE countries remain limited. Second, the mediating role of national institutional contexts specific to these states is insufficiently explored in quantitative models. Third, the interaction between minimum wage dynamics and SDG 8 is not sufficiently addressed empirically. To bridge these gaps, this article offers a mixed-method analysis of five CEE

countries, combining a robust econometric model with a qualitative interpretation of national institutional contexts. This integrated approach seeks to generate a more nuanced understanding of how minimum wage policies affect youth employment within the broader framework of sustainable development.

2.6. The CEE Labour Market Context

The labour market in Central and Eastern Europe is characterized by two particularly relevant structural features: the prevalence of informal employment and the low coverage of collective bargaining. Economies in the CEE region often display a combination of low collective bargaining coverage and high levels of informal employment. In this type of environment, minimum wage increases may generate unintended substitution effects, where employers choose to hire young or less experienced workers informally or engage them in undeclared work [55].

Institutional and sectoral heterogeneity within industries can influence labour market outcomes [56]. By analogy, in countries with extensive informal sectors, upward pressure on minimum wages may not necessarily lead to higher youth unemployment, but it can amplify the duality between formal and informal employment. Informality thus acts as a buffer, absorbing part of the employment adjustment, albeit potentially at the cost of job quality [55].

Moreover, the limited coverage of collective bargaining implies that wage floors are primarily set through legislation rather than social dialogue. Therefore, the ability of sectoral agreements to adjust wages according to productivity differences is limited. Consequently, minimum wage increases may amplify adverse effects on formal youth employment, especially in sectors with limited institutional channels for gradual wage adjustment [55].

2.7. Hypotheses

Based on the literature review and the mixed empirical evidence presented, this article proposes three main hypotheses for the five CEE countries under analysis.

Hypothesis 1 (H1). *Increases in the minimum wage are associated with a rise in youth unemployment.*

Justification: This hypothesis is grounded in the neoclassical theoretical framework [22,23], which highlights the reduction in labour demand, particularly for workers with low marginal productivity, when the statutory minimum wage is set above the market equilibrium level. In emerging countries or those with rigid labour market structures, increases in the minimum wage have been correlated with higher youth unemployment, as evidenced by meta-analysis conducted by Neumark and Wascher [21] and Belman and Wolfson [4]. Within CEE countries, the negative effect may be more pronounced due to the substantial and rapid increases in the minimum wage.

Hypothesis 2 (H2). *A favourable macroeconomic environment is associated with a lower youth unemployment rate.*

Justification: According to business cycle theory, youth unemployment is strongly counter cyclical [57,58]. Robust economic growth, measured by GDP per capita, stimulates aggregate demand and reduces unemployment [59]. Conversely, macroeconomic instability, measured by the inflation rate, increases uncertainty and discourages hiring [60].

Hypothesis 3 (H3). *Higher levels of general social exclusion among young people are positively correlated with the youth unemployment rate.*

Justification: This hypothesis considers the NEET rate as an indicator of the structural vulnerabilities of the labour market of the challenges arising from the mismatch between skills acquired in the education system and the requirements of the workplace [53,61]. Studies reveal a positive correlation between high NEET rates and youth unemployment, highlighting both the difficulties in the school-to-work transition and the complex dysfunctions of the labour market [62].

3. Methodology

This article employs a quantitative approach to analyze the impact of changes in the minimum wage on youth unemployment rates in five Central and Eastern European (CEE) countries. The methodology relies on secondary data collected from official sources, allowing for the application of an econometric model suitable for panel data analysis. The study utilizes a balanced dataset covering the period 2010–2024 and includes five countries: Bulgaria, Hungary, Poland, Romania and Slovakia. The selection of this sample was based on economic comparability and similarities, as well as their shared challenges related to youth integration into national labour markets. All data was obtained from the Eurostat database ensuring transparency and the replicability of results.

The proposed econometric model includes one dependent variable and several independent variables selected based on relevant literature:

- Dependent variable: Youth unemployment rate (%) measures the share of unemployed individuals aged 15–24 who are available for and actively seeking work, as a percentage of the total labour force in the same age group. The variable is used as a proxy for the difficulties faced by young people in entering the labour market (Eurostat dataset code: une_rt_a).
- Independent variables:
 - Minimum wage: The statutory minimum wage, expressed in nominal Euro (Eurostat dataset code: earn_mw_cur). For the main analysis, the nominal Euro value was selected for two main reasons. First, it reflects the political and public benchmark in the CEE region, where wage convergence with the Eurozone is a primary policy goal. Second, the nominal Euro value is a direct labour cost that affects competitiveness for firms that operate in integrated European markets. This measure ensures cross-country comparability in a single currency, although it does not capture differences in national price levels.
 - Labour productivity: measured as the annual percentage change in real output per hour worked. This variable captures annual changes in economic efficiency, adjusted for inflation and expressed relative to actual working time. It also reflects the firms' capacity to absorb wage cost adjustments (Eurostat dataset code: namq_10_lp_ulc).
 - Inflation (%): Highlights macroeconomic fluctuations, reflecting the erosion of purchasing power and its indirect influence on firm and employee behaviour (Eurostat dataset code: prc_hicp_manr).
 - Real GDP per capita (EUR): Measured in chain-linked volumes. This inflation-adjustment method is superior to traditional price index methods and provides a more accurate framework for analyzing real economic growth over time (Eurostat dataset code: sdg_08_10).
 - NEET rate (%): Represents the proportion of young people not in employment, education or training (Eurostat dataset code: edat_lfse_20), aged 15–24. While

it may initially appear similar to the dependent variable, it in fact captures distinct and complementary dimensions of youth vulnerability in the labour market. Unlike the unemployment rate, which excludes inactive youth not actively seeking employment, the NEET rate provides a broader measure of social exclusion. Including the NEET rate as a control variable helps isolate the specific impact of wage policies from broader structural factors affecting youth exclusion. Multicollinearity tests confirmed that including this variable does not compromise the model's stability. From a sustainable development perspective, the inclusion of both indicators allows for an analysis of labour market imbalances as well as deeper social challenges. The NEET rate is included to account for wider labour market vulnerability, encompassing inactive youth who are not counted in the unemployment rate, thereby helping to isolate the specific effect of minimum wage policies.

To assess the relationship between the variables, a fixed-effects panel regression model was employed. This method was chosen to control for unobserved heterogeneity that is country-specific and constant over time. The decision was validated using the Hausman test. Thus, the model isolates the effects of the variables by analyzing within-country variation over the studied period.

The empirical model follows a fixed-effects panel regression framework:

$$Y_Unmp_{it} = \beta_0 + \beta_1 MinWage_{it} + \beta_2 LaborProd_{it} + \beta_3 Inflation_{it} + \beta_4 GDPpc_{it} + \beta_5 NEETrate_{it} + \alpha_i + \varepsilon_{it}$$

where

i indexes the countries ($i = 1, \dots, 5$) and t indexes the years ($t = 2010, \dots, 2024$);

Y_Unemp_{it} represents the youth unemployment rate in country i in year t ;

$MinWage_{it}$ is the statutory minimum wage;

$LaborProd_{it}$ is labour productivity;

$Inflation_{it}$ is the annual inflation rate;

$GDPpc_{it}$ is real GDP per capita;

$NEETrate_{it}$ is the percentage of young people not in employment, education or training.

The coefficients β_1 – β_5 capture the marginal effects of the explanatory variables on youth unemployment. α_i denotes the country-specific fixed-effects, which control for all unobserved, time-invariant characteristics of each country. The error ε_{it} is assumed to be idiosyncratic and uncorrelated with the explanatory variables after controlling for α_i .

Additionally, to ensure the validity and robustness of the results, a series of diagnostic tests were performed:

- Multicollinearity test (VIF): The Variance Inflation Factor (VIF) was calculated to detect potential strong correlations between independent variables and to avoid biased estimates.
- Heteroscedasticity test (Breusch–Pagan): This test was used to examine the assumption of homoscedasticity. The detection of heteroscedasticity led to the use of robust standard errors in the final model estimation, thereby supporting the validity of statistical inference.
- Autocorrelation test (Wooldridge): This test identifies serial correlation of errors. The presence of autocorrelation was confirmed and robust cluster-adjusted standard errors were subsequently applied to correct both heteroscedasticity and autocorrelation.

The econometric analysis was conducted using the Python (version 3.11) programming language, employing the pandas, statsmodels and linearmodels libraries. Furthermore, the authors acknowledge the presence of minor breaks in some time series, as indicated

by Eurostat. These were considered as a minor limitation inherent in long-term panel data analysis.

4. Results

This chapter presents the empirical findings of econometric analysis. To explore the relationship among the variables, Table 1 reports the correlation matrix. The results indicate that the NEET rate is strongly and positively correlated with youth unemployment ($r = 0.632$). Minimum wage ($r = -0.551$) and real GDP per capita ($r = -0.356$) display a moderate negative correlation with youth unemployment. Inflation ($r = -0.312$) shows a weak negative correlation and labour productivity is essentially uncorrelated with youth unemployment ($r = 0.016$).

Table 1. Correlation matrix of the main variables.

Variable	Youth Unemployment	Minimum Wage	Labour Productivity	Inflation	Real GDP Per Capita	NEET Rate
Youth unemployment	1.000	−0.551	0.016	−0.312	−0.356	0.632
Minimum wage	−0.551	1.000	−0.098	0.436	0.802	−0.723
Labour productivity	0.016	−0.098	1.000	−0.147	−0.091	0.047
Inflation	−0.312	0.436	−0.147	1.000	0.314	−0.278
Real GDP per capita	−0.356	0.802	−0.091	0.314	1.000	−0.752
NEET rate	0.632	−0.723	0.047	−0.278	−0.752	1.000

Notes: The table reports Pearson correlation coefficients for all variables in the model. Source: Own calculations by the authors based on Eurostat data.

To ensure methodological rigour, both fixed-effects (FE) and random-effects (RE) models were estimated and the comparative results are presented in Table 2.

The coefficient for the minimum wage is the most notable, being positive and statistically significant in the FE model, while negative and significant in the RE model. This sign reversal for the key variable of interest, combined with counterintuitive results for other variables such as GDP per capita, suggests that the core assumption of the RE model is violated. Specifically, this indicates the presence of correlation between the unobserved country-specific effects and the explanatory variables, contrary to the RE model's assumptions.

To empirically assess the determinants of youth unemployment, a FE panel regression model was estimated. Table 2 presents the results of this model, which was applied to a dataset comprising 75 observations. The overall validity of the model is strongly supported by the F-statistic, which has a value of 101.82 and a p -value of 0.0000. This leads to the rejection of the null hypothesis that all explanatory variable coefficients are jointly equal to zero. Therefore, the model demonstrates real predictive capacity and the selected variables collectively explain a substantial portion of the variation and dynamics of youth unemployment. The model's overall fit is also notable, by an R-squared value of 0.8868, meaning that the independent variables account for 88.68% of the variation in youth unemployment within each country in the sample over the analyzed period. Thus, the model is effective in capturing the temporal dynamics of the studied phenomenon.

The econometric analysis reveals a central conclusion, highlighting significant implications for public policy in Central and Eastern Europe and the need to acknowledge a

substantial and statistically robust trade-off. These findings are further supported by the individual coefficients summarized in Table 3.

Table 2. Model comparison: fixed-effects versus random-effects.

Variable	Fixed Effects	Random Effects
Minimum wage (EUR)	0.0244 (4.9270)	−0.0188 (−2.9744)
Labour productivity	0.0055 (0.0476)	−0.07388 (−0.2897)
Inflation	0.2731 (3.4063)	−0.1794 (−1.0555)
Real GDP per capita	−0.0041 (−8.8154)	0.0013 (3.7077)
NEET rate	1.2186 (7.3924)	1.4004 (5.2998)
constant	45.811 (8.0833)	−5.6509 (−0.8440)
Model Diagnostics		
Observations	75	75
R-squared (within)	0.8868	0.5647
F-statistic	101.82	15.205
<i>p</i> -value (F-stat)	<0.001	<0.001
Hausman Test	279.16 (<i>p</i> -value < 0.001)	

Notes: The dependent variable is the youth unemployment rate (%). T-statistics are reported in parentheses. The Hausman test rejects the null hypothesis, confirming that the FE model is the appropriate specification. Source: Own calculations by the authors based on Eurostat data.

Table 3. Fixed-effects panel regression results for youth unemployment rate.

Variable	Coefficient	Std. Error	t-Statistic	<i>p</i> -Value
Minimum wage (EUR)	0.0244	0.0042	5.8512	0.0000
Labour productivity	0.0055	0.1138	0.0486	0.9614
Inflation	0.2731	0.0717	3.8115	0.0000
GDP per capita	−0.0041	0.0004	−10.050	0.0000
NEET rate	1.2186	0.1774	6.8686	0.0000
Model Diagnostics				
Observations	75			
R-squared (within)	0.8868			
F-statistic	101.82			
<i>p</i> -value (F-stat)	<0.001			

Notes: The dependent variable is the youth unemployment rate (%). The model includes country-specific fixed effects. Standard errors are robust and clustered at the country level. Source: Own calculations by the authors based on Eurostat data.

The main result of the model indicates that a coefficient of 0.0244 for the minimum wage variable, which is highly statistically significant ($p < 0.001$). Holding other macroeconomic and social conditions constant, an increase of €100 in the minimum wage is associated with a 2.44 percentage point increase in the youth unemployment rate. This finding underscores the significant impact of wage policies on employment opportunities

for individuals at the beginning of their careers or with limited work experience. The positive sign of the coefficient supports the hypothesis that a high wage floor can constitute a barrier to labour market entry for young people. Moreover, the impact of wage policies on youth is intrinsically tied to the overall health of the economy, which forms the foundation upon which employment opportunities for the analyzed age group can be either built or eroded.

The coefficient of GDP per capita is -0.0041 and is also highly statistically significant ($p < 0.001$). The negative sign indicated an inverse relationship between economic prosperity and youth unemployment, a result which supports the idea that promoting sustainable economic growth can serve as an effective social policy for youth. As demand for goods and services increases in an expanding economy, firms are more inclined to hire. This favourable macroeconomic context benefits all age groups, including youth, who may gain access to more job opportunities. Additionally, cost shocks, such as wage increases, can be more easily absorbed in a dynamic economy and the trade-off between wages and jobs is therefore mitigated.

Conversely, the coefficient for inflation is 0.2731 and it is statistically significant ($p = 0.0019$). This result illustrates a macroeconomic context marked by instability. The positive sign reflects a direct relationship between inflation and youth unemployment, indicating that periods of high inflation significantly influence business decision-making. Higher costs make firms more cautious, often opting to maintain their current workforce and limiting new employment opportunities, particularly for young job seekers.

The NEET rate coefficient is strongly positive (1.2186) and highly statistically significant ($p < 0.001$), confirming that youth unemployment is notably higher in contexts where a larger proportion of young people are already disconnected from any form of socio-economic participation. This coefficient should be interpreted as a barometer of the social context, highlighting the vulnerability of youth in the labour market, rather than as a direct cause of unemployment. Youth unemployment represents the visible and tangible tip of a broader phenomenon of social exclusion and structural labour market challenges. An education system that fails to equip young people with a broad range of skills aligned with labour market needs will likely produce discouraged or unemployed youth. Furthermore, the absence of job opportunities or training programmes may lead to a scarring effect, driving many young people into inactivity.

The Productivity Paradox

A surprising result of the model is the lack of statistical significance for the labour productivity coefficient ($p = 0.9519$). Although economic theory posits that productivity growth should stimulate employment, the model's results indicate that this relationship is more complex in the context of the analyzed CEE countries. Similar patterns have been observed in previous research on CEE countries, when gains in labour productivity did not necessarily translate into increases in employment or wages [63–65]. This paradox can be supported by three complementary explanations:

- (a) Aggregation bias: Productivity within the model is measured at the national level, an approach that may mask significant heterogeneity across sectors. Productivity growth is often concentrated in high-tech or export-oriented industries, while youth employment is disproportionately significant in low-productivity service sectors [45,66].
- (b) Short-term versus Long-term dynamics: Productivity gains are often long-term, structural processes and their impact on employment is perceived gradually and with a lag [67]. In contrast, the proposed model's results show that youth unemployment is highly responsive to short-term adjustments. Firms' hiring decisions for entry-level

positions during the analyzed period were likely shaped more by immediate cost shocks and uncertainty rather than by gradual productivity improvements [68].

- (c) The role of informality and job quality: In CEE countries, a significant portion of youth employment is informal or precarious. These jobs are weakly connected to national productivity trends, which attenuates the link between productivity and employment in aggregate models [69–71]. When productivity growth occurs predominantly in formal, capital-intensive sectors, while young people remain in informal or low-productivity activities, the macro-level relationship is naturally weakened.

Taken together, these explanations suggest that the insignificance of productivity in our model should not be interpreted as a rejection of theory, but rather as a reflection of structural and measurement issues in the CEE labour markets. Future work should incorporate more disaggregated indicators, such as productivity data at the NACE sector level, to test whether productivity has heterogeneous effects depending on sectoral youth intensity.

To ensure the validity and robustness of the model, a series of standard diagnostic tests was conducted. An essential component of model validation involves checking for multicollinearity. The Variance Inflation Factor (VIF) was calculated for each explanatory variable in the model. As shown in Table 4, all independent variables in the model have VIF values below the critical threshold of 5. The highest values are recorded for minimum wage (3.44) and GDP per capita (3.40), indicating a moderate correlation that is economically expected. However, this correlation is not strong enough to compromise the model. Therefore, the model does not suffer from significant multicollinearity, which enhances the credibility of the analysis and the conclusions derived from the regression results.

Table 4. Multicollinearity diagnostics—VIF.

Variable	VIF
Minimum wage (EUR)	3.44
Labour productivity	1.03
Inflation	1.26
GDP per capita	3.41
NEET rate	2.54

Notes: All independent variables have VIF values well below the commonly cited threshold of 5, indicating that multicollinearity does not compromise the coefficient estimates. Source: Own calculations by the authors based on Eurostat data.

A fundamental assumption in panel data analysis is the absence of serial autocorrelation. Violating this assumption can lead to inefficient standard error estimates and potentially invalid statistical inference.

Wooldridge test results, presented in Table 5, indicate a clear violation of the non-autocorrelation assumption.

Table 5. Autocorrelation test results.

Test	Statistic	Value	<i>p</i> -Value	Conclusion
Wooldridge Test for autocorrelation	t-statistic	4.7496	<0.001	Reject H_0 . Serial autocorrelation is present.

Notes: H_0 (the null hypothesis) for the Wooldridge test is that there is no first-order serial autocorrelation in the panel model's residuals. Source: Own calculations by the authors based on Eurostat data.

The *p*-value ($p < 0.001$) leads to a strong rejection of the null hypothesis of no autocorrelation, providing significant statistical evidence that the model's residuals exhibit serial correlation. The positive and moderate value of Rho (0.5095) reveals that approximately

51% of the unobserved shocks in one year persist into the next year for the same country. This situation is economically plausible, as unexpected shocks affecting youth unemployment in one year are unlikely to dissipate immediately and may have lagged effects in subsequent periods.

To test the assumption of homoscedasticity, the Breusch–Pagan test was applied to assess whether the variance of the residuals depends on the explanatory variables. The results are as follows (Table 6).

Table 6. Breusch–Pagan test.

Test	Value	<i>p</i> -Value
LM-statistic	12.77	0.0257
F-statistic	2.83	0.0220

Notes: H_0 (the null hypothesis) for the Breusch–Pagan test is homoscedasticity. The *p*-value for the LM-statistic is below the 0.05 significance level, leading to the rejection of the null hypothesis. Source: Own calculations by the authors based on Eurostat data.

The *p*-value associated with the LM statistic is 0.0257, which is below the 5% significance threshold. As a result, the null hypothesis of homoscedasticity is rejected, indicating the presence of heteroscedasticity in the model. This can lead to incorrect conclusions about the statistical significance of the coefficients if left unaddressed. However, the model employs robust, country-clustered standard errors, a method that simultaneously corrects for both heteroscedasticity and potential autocorrelation of the residuals within each time series.

5. Discussion

The empirical results presented in the previous chapter have provided clear answers to the research hypothesis formulated based on the literature review. This chapter offers an in-depth examination of how the data validate each hypothesis and explores the implications of the econometric findings, subsequently discussing the benefits and risks of wage policies and their relevance for achieving the Sustainable Development Goals (SDGs). The analysis captures the trade-offs between minimum wage increases and youth unemployment in CEE countries, highlighting the institutional features specific to each country.

5.1. The Impact of the Minimum Wage: Confirming a Trade-Off in the CEE Context (H1)

The empirical results outlined in the previous chapter illustrate the dynamics of youth unemployment in CEE and reveal a central conclusion: the existence of a significant trade-off between increases in the minimum wage and employment opportunities for young people. The model's results confirm Hypothesis 1 (H1), through the positive and statistically significant coefficient for the minimum wage, aligning with the neoclassical perspective [3,22]. In the CEE context, this effect is amplified by the substantial wage increases aimed at accelerating income convergence [72], which, although increasing the incomes of low-wage workers, may exert downward pressure on labour demand for young and less qualified workers [5,16].

5.2. The Fundamental Role of Favourable Macroeconomic Context (H2)

Hypothesis 2 (H2) is strongly supported by the model's results, showing a negative and statistically significant coefficient for GDP per capita and a positive and statistically significant coefficient for inflation. These findings indicate that an expanding economy directly generates jobs and creates a conducive framework for firms to invest in young labour [58,59]. Furthermore, this result underscores the need to achieve SDG target 8 for

sustainable economic growth, as the formulation of youth and labour market policies must be predicated on the existence of a stable macroeconomic context [1,60].

5.3. *Social Exclusion as a Structural Challenge in the Labour Market (H3)*

In line with Hypothesis 3 (H3), the model highlighted the strong and positive relationship between the NEET rate and youth unemployment. The positive coefficient of the NEET rate served as a barometer for the social context, revealing the existence of deep structural challenges in the labour market [53,61]. Labour market difficulties are not isolated but are linked to the effectiveness of the education system in meeting labour market demands [73]. Therefore, minimum wage policies should be accompanied by social and educational initiatives that address the challenges targeted under SDG 8.6 [45].

5.4. *The Expected and Controversial Benefits of the Minimum Wage*

The impact of the minimum wage on youth unemployment is not limited solely to the trade-off discussed earlier, but also encompasses the benefits it brings, serving as a tool that ensures social justice, reduces inequality and promotes decent work [29,30]. The primary benefit lies in the minimum wage's ability to reduce wage inequality by acting as a wage floor for remunerated workers, leading to a compression of the lower tail of the wage distribution [41,74]. Moreover, this impact generates spillover effects, whereby wages of workers earning slightly above the minimum wage are also increased to maintain wage hierarchies [75,76]. In contrast, the erosion of the real value of the minimum wage has been directly associated with rising inequality [74,75].

The distributive role of the minimum wage is essential for achieving SDG 8, particularly Target 8.5, which aims to ensure “decent work and fair wages” for all [1]. The minimum wage thus is expected to become a key public policy instrument for reducing in-work poverty, a persistent problem for young workers in low-paying sectors such as retail and hospitality [19,51]. By generating employment with income sufficient for a decent standard of living, the minimum wage should contribute to social sustainability by reducing dependence on social assistance and promoting sustainable economic independence [52].

Furthermore, potential long-term productivity benefits should be emphasized. Firms facing higher labour costs may shift toward business models focused on productivity growth and higher wages, incentivizing investment in new technologies. These optimizations and investments in employee training to justify higher wages could create a wage-induced shock [4]. Although our model did not directly address this effect, this potential benefit could contribute to structural modernization of the economy and sustainable economic growth [30,33]. Therefore, an in-depth analysis must balance the advantages and disadvantages of raising the minimum wage, acknowledging that its implications extend beyond employment statistics.

5.5. *The Other Side of the Coin: Entry Barriers for Youth and Economic Repercussions*

In addition to highlighting potential benefits, the risks associated with minimum wage increases are reflected in the reduction in employment opportunities for the most vulnerable segments of the workforce [21,23]. The analysis conducted in the previous chapter empirically quantifies this risk, suggesting that wage increases are associated with higher youth unemployment rates in CEE countries. This finding provides empirical support for the neoclassical theoretical framework, which posits that a wage floor set above the market equilibrium may lead to higher unemployment, particularly for inexperienced employees [5,22]. In the specific context of CEE countries, this effect is accentuated by significant wage increases over the past decade, affecting productivity growth in sectors that predominantly employ young workers [72].

Beyond statistical results regarding unemployment rates, a broader and longer-term risk relates to the sustainability of young people's careers. The specialized literature frames this phenomenon through the concept of the "scarring effect" [7,48]. Imposing a minimum wage that is too high could create unsustainable career paths for early career workers, jeopardizing the achievement of SDG 8. Furthermore, successive and aggressive increases not aligned with productivity growth will generate inflationary pressures and challenge firms' competitiveness. High labour costs will lead companies to pass costs onto consumers, eroding employees' real wage gains [28]. Studies have shown that small and medium-sized enterprises are often disproportionately affected by minimum wage increases, having limited capacity to absorb cost shocks [72,77]. Thus, wage policies must carefully consider the risks for economic sectors employing young people to ensure a prudent balance between protecting income and providing employment opportunities in the labour market.

5.6. Analysis of National Contexts

Although the econometric analysis captures the negative effect of the minimum wage on youth unemployment, the actual implications of wage policies differ significantly throughout the five countries examined. The heterogeneity of effects can be explained through a detailed examination of the institutional frameworks in which the minimum wage operates, emphasizing differences in wage-setting mechanisms, economic structure and active labour market policies. This descriptive country-level analysis occurs after the econometric results in order to contextualize the findings, enabling a comparative synthesis that informs the ensuing policy recommendations.

- Bulgaria

Low incomes have created pressure to accelerate wage convergence and the minimum wage has often had an administrative character, influenced by political "catch-up" objectives rather than a transparent, tripartite social dialogue grounded in economic data [78]. This strategy is emphasized by the data (see Appendix A): between 2010 and 2024, the minimum wage increased nearly 300% (from EUR 123 to EUR 477). This substantial rise occurred in an economy with relatively low labour productivity, even registering negative growth in 2013 and 2023. Repeated and sharp increases in formal labour costs may lead firms to reduce employment opportunities for young workers or to resort to informal solutions, a significant risk in an economy with a large shadow sector [79]. Employment options for early-career workers in Bulgaria are limited due to the lack of active labour market policies, a fact reflected in the NEET rate (see Appendix A), which, despite decreasing, remains high (10.5% in 2024), further increasing the vulnerability of this age group [78]. Thus, in Bulgaria, the negative impact of the minimum wage on youth unemployment is amplified by low productivity, high informality and the absence of active support policies. The negative and statistically significant effect revealed in the econometric model is in line with this country-specific pattern.

- Hungary

Hungary is characterized by an interventionist and often politicized economic approach, where institutional arrangements related to the minimum wage are frequently used as strategic tools to achieve broader political objectives [80]. Decisions on wage increases are centralized and administrative in nature, announced by the government. The National Economic and Social Council, the formal consultative forum with social partners, has a limited role and collective bargaining is restricted [81]. The absence of a predictable, data-driven wage enforcement mechanism generates uncertainty for the business environment. The labour market exhibits significant structural heterogeneity, divided between western regions and areas around the capital, which benefit from abundant foreign direct

investment and high-productivity sectors, and the eastern and southern regions, which are based on low-added industries. As a result, the negative effect of the minimum wage estimated in the model may mask regional impacts. In developed economic areas, higher labour costs are more easily absorbed and the effect on youth employment may be smaller. In contrast, in poorer and less productive regions, the risk of youth exclusion from the labour market is likely more pronounced. Hungary has implemented active labour market policies, but these have often been criticized for their inability to facilitate a sustainable transition of young people into private-sector jobs [82]. The data reflect these challenges (see Appendix A): although the unemployment rate fell significantly by 2019 (9.9%), periods of slower economic growth (such as 2023–2024) were accompanied by renewed pressures on youth unemployment (15.2% in 2024). This country-level evidence supports the negative relationship identified in the econometric model, highlighting the relevance of regional disparities.

- Poland

Poland represents a regional counterexample, where the negative effect of the minimum wage on youth unemployment appears more muted. The Polish economy exhibits remarkable dynamism, with a steady increase in GDP per capita, which exceeded EUR 16,000 in 2024 (see Appendix A). This dynamism generates a constant demand for labour, including for young people [83]. Moreover, the institutional framework for setting the minimum wage in Poland is essential for the proper functioning of the labour market. Decisions agreed upon within the Social Dialogue Council, a tripartite body comprising the government, trade unions and employers' organizations, determine the level of increases. This formal process takes into account arguments regarding productivity, inflation and competitiveness, resulting in more predictable wage increases [84]. Although the minimum wage rose substantially (see Appendix A), from EUR 318 in 2010 to EUR 998 in 2024, the data suggest that the labour market absorbed this shock relatively well: youth unemployment remained at a relatively low level (10.8% in 2024) and the NEET rate decreased steadily to 7%. Poland's labour market is characterized by a high degree of flexibility, with widespread use of atypical contracts (civil contracts) [85]. Although this flexibility has been criticized for creating duality in the labour market, it allowed firms to adjust costs without resorting to large-scale layoffs of employees with standard contracts [86]. Thus, in Poland, the impact of minimum wage increases is more moderate, supported by a favourable economic and institutional context, a flexible labour market and a functional social dialogue that ensures predictability. This observation corroborates the relatively modest negative effect identified in the econometric model.

- Romania

Romania has used the minimum wage as a primary tool to accelerate income convergence, a strategy that has led to rapid and substantial percentage increase [72]. This dynamic directly affected the wage structure, causing a sharp rise in the Kaitz index (the ratio of the minimum wage to the median wage) [87]. During the analyzed period, the minimum wage increased by over 430% from EUR 137 to EUR 743 (see Appendix A). Unlike in Poland, Romania's institutional framework for setting the minimum wage has low predictability and social dialogue is often difficult. Increase decisions were not based on a transparent calculation formula or genuine consensus with social partners. The role of the National Tripartite Council for Social Dialogue was generally consultative, and council negotiations were largely formal [88]. These factors generated uncertainty for businesses, particularly SMEs, which faced difficulties regarding labour costs [89]. Moreover, persistent informal economies and low labour productivity were not always targeted by macroeconomic strategies and aggressive labour costs limited opportunities for young people in the

labour market [89]. The data reflects these challenges (see Appendix A): despite economic growth, youth unemployment remains high (21.8% in 2024) and the NEET rate increased after 2020, reaching 17% in 2024. These obstacles for young people are amplified by the absence of active labour market policies to support their transition from school to the labour market, such as apprenticeship, training or professional development programmes [90]. The enduring high rates of young unemployment are consistent with the overall negative relationship identified by the model.

- Slovakia

Slovakia's economy is strongly integrated into European value chains, with high-productivity sectors in the western part of the country, particularly in the automotive and electronics industries [91]. These sectors have a high capacity to absorb wage shocks and at the aggregate level, the negative effect of the minimum wage on youth employment may be lower compared to less industrialized economies. Similarly to Hungary, Slovakia exhibits pronounced duality and regional heterogeneity. In less developed regions in the central and eastern parts of the country, increases in the minimum wage pose a real obstacle to youth employment [92]. Data reflect this complexity (see Appendix A): although Slovakia significantly reduced youth unemployment since 2010 (34.9%), it remains high (19.2% in 2024), suggesting that the benefits of the industrial sector do not spread evenly across all employee groups. Unlike the other countries analyzed, Slovakia belongs to the Eurozone and does not have exchange rate tools to adjust to economic shocks or maintain external competitiveness [93]. Consequently, wage policies carefully need to consider macroeconomic effects, since wage increases that significantly exceed productivity growth can quickly erode export competitiveness [94]. Therefore, in Slovakia, aggregate risks appear mitigated by strong industrial sectors, though existing regional disparities can disproportionately affect young people outside major industrial centres. The moderate negative effect identified econometrically reflects the mixed regional disparities described above.

5.7. Comparative Synthesis

The econometric results indicate an overall negative effect of the minimum wage on youth unemployment, but the magnitude of this impact varies significantly across the analyzed countries. To provide a comparative synthesis, three key factors are examined: wage-setting mechanisms, economic structure and complementary policies.

- Wage-setting mechanisms: Poland ensures predictability through tripartite negotiations and by linking wage increases to macroeconomic indicators, while in Romania and Bulgaria uncertainty is particularly burdensome for the business environment due to rapid and politically motivated hikes. Hungary and Slovakia occupy an intermediate position, with consultative forums in place, but the final decision often remains centralized and politically influenced.
- Economic structure: Poland's dynamic and diversified economy generates a constant demand for labour, which helps absorb cost shocks. In contrast, in Romania and Bulgaria, the risks associated with successive wage increases are amplified by low productivity and the persistence of an extensive informal sector. Hungary and Slovakia display structural duality: export-oriented and high-productivity sectors absorb wage hikes more easily, while poorer regions remain highly vulnerable.
- Complementary policies: the absence of effective active labour market policies in Bulgaria and Romania further increases the exposure and vulnerability of young people. By contrast, Poland's labour market flexibility (e.g., civil law contracts) has functioned as an adjustment mechanism, despite criticisms of duality. In Hungary, large-scale public works programmes have had limited success in fostering sustainable

private sector employment, while Slovakia has pursued a more cautious wage policy due to the absence of exchange rate tools for adjustment as a Eurozone member.

The trade-off between higher minimum wages and youth employment is most acute in Romania and Bulgaria, where unpredictable increases coincide with low productivity and weak institutional mechanisms. In Hungary and Slovakia, aggregate resilience may mask significant regional disparities. Poland represents a case of relative resilience, combining robust growth, flexible adjustment mechanisms and functional institutions. Therefore, even though our econometric model captures a considerable average effect, comparative research emphasizes that national institutional frameworks and economic structures are the essential mediating elements that ultimately determine how minimum wage policies impact young employment outcomes.

5.8. Implications for Sustainable Development Goal 8

The empirical results offer valuable insights regarding the relevance of public policies in pursuing SDG 8, particularly in Central and Eastern Europe countries that face the challenge of balancing wage equity with employment opportunities for young people.

The positive and statistically significant coefficient estimated for the minimum wage variable reveals a direct tension between two key targets under SDG 8.5. On one hand, increasing the minimum wage serves as a crucial instrument for promoting decent work, on the other hand, empirical evidence suggests that such increases may hinder the achievement of full employment for young workers. Therefore, these two objectives cannot be simultaneously achieved solely through minimum wage policies, challenging the notion of a universally sustainable approach.

Accordingly, the strong positive relationship between the NEET rate and youth unemployment underscores the importance of SDG Target 8.6, highlighting the adverse effects on youth employment, as discouraged young individuals tend to withdraw from the labour market and become inactive, thereby expanding the NEET population. Hence, achieving SDG 8 in the CEE region requires more than wage regulation. It calls for prudent, evidence-based adjustments alongside the implementation of robust Active Labour Market Policies (ALMPs) and increased investment in education and vocational training. Sustainable and inclusive labour markets therefore depend on comprehensive and well-designed policies that support both social fairness and economic growth.

5.9. Policy Implications

Bulgaria: Develop formal consultation procedures and increase assistance for young people into labour market, wage policy could become less volatile. Youth employment would be further shielded from minimum wage shocks through policies aimed at lowering informality and increasing labour productivity in low-wage industries.

Hungary: Ensure that young people in lower-productivity areas obtain training, mobility incentives or local employment opportunities in order to reduce regional disparities. This can be achieved by merging national wage policy with initiatives particular to specific region.

Poland: Continue to encourage labour market flexibility which has been successful in cushioning youth employment from cost shocks and maintain the predictability of minimum wage changes.

Romania: To mitigate the detrimental effects of rapid, politically motivated wage increases, prioritize bolstering institutional frameworks for wage setting and implement targeted active labour market policies (ALMPs).

Slovakia: Continue supporting active labour market policies intended for youth, especially in less industrialized regions and implement mindful wage-setting strategies that take regional vulnerabilities into consideration, given the restrictions of the Eurozone.

5.10. Study Limitations and Future Research Directions

The study relies on a short panel sample, covering five countries over a 15-year period, which may limit the statistical power of certain asymptomatic tests. Therefore, the results obtained from the estimated model should be interpreted as trends for the group of countries under analysis, while generalization to other economies in the region or to similar cases should be undertaken with caution.

In addition, the use of aggregate country-level data represents a limitation of this study, as it does not allow for the identification of sectoral or regional differences. The impact of the minimum wage is likely uneven across high-productivity service sectors or between capital regions and less developed areas, but aggregate data may prevent a formal test of these differences. Furthermore, the exclusive focus on the formal sector omits the impact of the informal economy, a phenomenon that is often present in the analyzed region. Based on these limitations, future directions could employ analyses using firm-level or individual-level microdata to better capture sectoral and regional heterogeneity. Moreover, investigating spillover effects on wage distribution and incorporating the impact of the informal sector remain important gaps in the literature for the CEE region.

Finally, a significant limitation of the statistical model lies in its inability to account for the impact of major external shocks during the analyzed period. These crises likely introduced temporary distortions in the relationship between the minimum wage and youth unemployment:

- Global financial crisis and the European sovereign debt crisis (2010–2014): The analyzed CEE countries experienced the effects of these events and adopted austerity policies, which generated substantial labour market challenges [95,96].
- COVID-19 pandemic (2020–2021) represented an unprecedented shock, with extensive government interventions aimed at temporarily decoupling employment from the sharp decline in output [97,98]. Consequently, the effect of the minimum wage on unemployment may have been temporarily distorted.
- War in Ukraine and the energy crisis (2022–2024), which have affected investment and employment decisions, as the prioritization of securing energy costs have often taken precedence over wage adjustments [99,100], possibly masking or amplifying wage–employment dynamics.

The study does not include specific variables to isolate the impact of these shocks and the estimated coefficients should therefore be interpreted as averages over the entire period, potentially masking parameter instability during crisis years. Future research could formally test for the presence of structural breaks using the Chow test and explicitly model them by introducing interaction dummy variables for crisis years.

Furthermore, the model excluded additional variables that influence youth unemployment, such as active labour market policies (ALMPs), informality, migration trends and educational attainment. Future research should address their exclusion as it could lead to bias. To strengthen causal inference, future research could employ system GMM or lagged regressors. Additionally, the potential endogeneity between minimum wage levels and youth unemployment, arising from reverse causality or policy endogeneity, could affect the estimated coefficients. Testing for such endogeneity was not feasible due to data constraints; however, future research should adopt instrumental variable or dynamic panel approaches to better isolate the causal impact of minimum wage policies.

Future research could enhance the approach through analyzing heterogeneity across industries and subnational areas, employing sectoral and regional data. Future research could enhance by considering real (PPP-adjusted) minimum wages to account for inflation and exchange rate variations, thereby providing a more accurate measure of purchasing power and cross-country comparability.

Future research could include formal stationarity test adapted for panel data (such as Levin–Lin–Chu or Im–Pesaran–Shin) and could investigate possible cointegration relationships among fundamental variables such as wages, productivity and economic growth. In addition, the integration of dynamic panel models, such as Panel VECM, could provide a clearer picture of short-term adjustments and long-term equilibrium trend. These perspectives may contribute to a deeper understanding of the mechanisms through which wage policies influence employment and could offer a stronger foundation for the formation of economic policy recommendations.

Despite these limitations, this article represents a significant contribution to the literature on the impact of the minimum wage in CEE countries, providing empirical evidence on the dynamics of youth unemployment. The results underline the necessity of creating a stable macroeconomic environment and developing a coherent institutional framework addressing the needs of young people. Therefore, each economy must implement effective policies capable of ensuring both social equality and economic sustainability.

6. Conclusions

This article examined the impact of minimum wage increases on youth unemployment rate in five Central and Eastern European countries (Bulgaria, Hungary, Poland, Romania and Slovakia), over the period 2010–2024. The study employed a fixed-effects panel regression model, providing a quantitative perspective on the trade-off between income protection and employment opportunities for young people, within the broader framework of the Sustainable Development Goals. The econometric analysis identified a positive and highly statistically significant effect of the minimum wage on youth unemployment rates in the countries analyzed. This finding empirically supports the neoclassical perspective, highlighting the existence of a real cost, in terms of employment opportunities, associated with minimum wage increases. Creating a stable macroeconomic context is essential for reducing unemployment, as measured in the model through GDP per capita and inflation. Moreover, the strong and positive correlation with the NEET rate highlighted deeper structural challenges in the labour market and in the school-to-work transition.

The findings of this article have relevant implications for designing effective public policies. A one-dimensional approach, focused solely on the administrative increase in the minimum wage, risks generating unintended consequences for vulnerable groups, particularly young people. Achieving a sustainable balance between income protection and employment opportunities requires a multidimensional strategy. Minimum wage increases should be predictable, based on objective economic criteria and accompanied by transparent social dialogue among policymakers, trade unions and the business sector. In addition, the implementation of active labour market policies is crucial for increasing productivity and employability among young people, through training programmes, apprenticeships and support for the transition from education to employment. These measures play a key role in maintaining macroeconomic stability and supporting sustainable economic growth.

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Appendix A

Table A1. Panel dataset used in the econometric analysis.

Country	Year	Youth Unemployment Rate (%)	Minimum Wage (EUR)	Labour Productivity	Inflation	GDP per Capita	NEET Rate
Bulgaria	2010	25.1	123	5.7	3	7060	21
Bulgaria	2011	28.2	123	4.5	3.4	7390	21.8
Bulgaria	2012	31.2	148	3.3	2.4	7530	21.5
Bulgaria	2013	31.5	159	−0.1	0.4	7600	21.6
Bulgaria	2014	26.9	174	0.6	−1.6	7760	20.2
Bulgaria	2015	24.7	194	3	−1.1	8130	19.3
Bulgaria	2016	20.4	215	2.6	−1.3	8480	18.2
Bulgaria	2017	16.1	235	1	1.2	8830	15.3
Bulgaria	2018	15.9	261	2.6	2.6	9180	15
Bulgaria	2019	12.1	286	5.2	2.5	9670	13.7
Bulgaria	2020	17.5	312	0.9	1.2	9450	14.4
Bulgaria	2021	15.8	332	6.9	2.8	10,250	13.9
Bulgaria	2022	10.6	363	3.1	13	10,740	12.3
Bulgaria	2023	12.1	399	−1.6	8.6	10,970	11.4
Bulgaria	2024	12.3	477	3.9	2.6	11,300	10.5
Hungary	2010	25.9	257	1.4	4.7	11,060	12.6
Hungary	2011	25.4	293	2.7	3.9	11,300	13.2
Hungary	2012	27.8	323	−1.4	5.7	11,220	14.8
Hungary	2013	26.1	332	0.8	1.7	11,490	15.5
Hungary	2014	20.1	328	−1	0	12,040	13.6
Hungary	2015	17.1	333	1.3	0.1	12,530	11.6
Hungary	2016	12.7	350	−1.7	0.4	12,880	11
Hungary	2017	10.5	413	3.2	2.4	13,460	11
Hungary	2018	9.9	418	4.8	2.9	14,240	10.7
Hungary	2019	11.4	461	4.6	3.4	14,980	11
Hungary	2020	12.7	452	0.4	3.4	14,370	11.7
Hungary	2021	13.6	476	3.3	5.2	15,470	10.6
Hungary	2022	10.6	504	2.1	15.3	16,170	9.8

Table A1. Cont.

Country	Year	Youth Unemployment Rate (%)	Minimum Wage (EUR)	Labour Productivity	Inflation	GDP per Capita	NEET Rate
Hungary	2023	12.8	624	0.7	17	16,060	9.8
Hungary	2024	15.2	675	0.3	3.7	16,190	10
Poland	2010	24	318	6.3	2.6	10,150	10.8
Poland	2011	26	347	4.9	3.9	10,680	11.5
Poland	2012	26.8	353	1.7	3.7	10,840	11.8
Poland	2013	27.6	369	0.9	0.8	10,930	12.2
Poland	2014	24.1	404	1.8	0.1	11,360	12
Poland	2015	21	418	2.5	−0.7	11,870	11
Poland	2016	17.8	417	2.1	−0.2	12,240	10.5
Poland	2017	14.9	473	4.9	1.6	12,870	9.5
Poland	2018	11.8	480	7.1	1.2	13,680	8.7
Poland	2019	9.7	529	1.6	2.1	14,310	7.9
Poland	2020	10.8	583	−1.3	3.7	14,310	8.4
Poland	2021	11.9	619	1.2	5.2	15,380	11.2
Poland	2022	10.8	642	4.6	13.2	15,840	8.1
Poland	2023	11.4	811	0.8	10.9	15,950	6.9
Poland	2024	10.8	998	4.9	3.7	16,470	7
Romania	2010	28	137	−2	6.1	8050	16.6
Romania	2011	29.4	158	6.5	5.8	8460	17.5
Romania	2012	28.2	157	2.6	3.4	8660	16.8
Romania	2013	29.6	179	1.5	3.2	8710	17
Romania	2014	30	205	4.1	1.4	9100	17
Romania	2015	27.3	235	4.9	−0.4	9430	18.1
Romania	2016	25.9	276	2.7	−1.1	9760	17.4
Romania	2017	23	319	7	1.1	10,620	15.2
Romania	2018	20.5	407	6	4.1	11,330	14.5
Romania	2019	21	439	2.9	3.9	11,830	14.7
Romania	2020	21.6	461	1	2.3	11,460	14.8
Romania	2021	21	467	0.9	4.1	12,190	18
Romania	2022	22.8	516	4.4	12	12,730	17.5
Romania	2023	21.8	604	2.6	9.7	13,030	16.5
Romania	2024	23.9	743	−1.2	5.8	13,130	17
Slovakia	2010	34.9	308	6.9	0.7	14,100	14.1
Slovakia	2011	34.8	317	1.5	4.1	14,540	13.8
Slovakia	2012	35.3	327	1.7	3.7	14,750	13.8
Slovakia	2013	34.9	338	2.5	1.5	14,830	13.7
Slovakia	2014	31	352	2	−0.1	15,220	12.8
Slovakia	2015	27.7	380	3.5	−0.3	16,000	13.7

Table A1. Cont.

Country	Year	Youth Unemployment Rate (%)	Minimum Wage (EUR)	Labour Productivity	Inflation	GDP per Capita	NEET Rate
Slovakia	2016	23.4	405	0.4	−0.5	16,280	12.3
Slovakia	2017	20	435	2.2	1.4	16,730	12.1
Slovakia	2018	15.8	480	2.6	2.5	17,380	10.2
Slovakia	2019	17.1	520	1.9	2.8	17,760	10.3
Slovakia	2020	20.4	580	6.9	2	17,270	10.7
Slovakia	2021	20.6	623	5.7	2.8	18,320	11
Slovakia	2022	19.9	646	−3.1	12.1	18,350	9.6
Slovakia	2023	19.8	700	1	11	18,750	8.9
Slovakia	2024	19.2	750	2	3.2	19,130	8.7

Source: Authors' own compilation based on Eurostat data.

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