

THE ECONOMIC AND SOCIAL DETERMINANTS OF NEET RATES IN EUROPEAN UNION COUNTRIES

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Abstract

The transformations of the European labour market have increased the relevance of studies addressing occupational vulnerability and the challenges associated with the professional integration of young people. This paper aims to examine the economic and social determinants influencing the NEET (Not in Education, Employment, or Training) rate across the European Union, while also identifying the structural differences among European economies according to labour market characteristics. In order to achieve this objective, we use two panel data regression models in order to analyze the effects of economic, occupational, and social factors on the NEET rate, and to highlight the structural differences identified between genders. The results of the analysis show that the female NEET rate does not appear to be driven primarily by labour market fluctuations or by conventional macroeconomic factors, but rather by the continuity and stability of women's participation in economic activity. For the young men, our model identifies a broader set of factors associated with occupational vulnerability, dominated by long-term unemployment, poverty risk, and the persistence of unemployment spells as the main exclusionary mechanisms.

Keywords: European Union labour market, NEET, panel data model, gender disparities

JEL Classification: C33, J16, J71

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1. Introduction

The transformations of the European labour market have increased the relevance of studies addressing occupational vulnerability and the challenges associated with the professional integration of young people. The expansion of flexible employment arrangements, the structural changes affecting modern economies, and the persistent disparities among European labour markets have contributed to the emergence of new forms of employment instability, generating differentiated effects on male and female populations. Within this framework, the present research aims to examine the economic and social determinants influencing the NEET (*Not in Education, Employment, or Training*) rate across the European Union, while also identifying the structural differences among European economies according to labour market characteristics. The study is structured into six sections reflecting the main stages of the research process, ranging from the theoretical and methodological foundations to the interpretation of findings and the formulation of final conclusions.

The purpose of this research is to identify the structural disparities characterizing labour markets within the European Union and to examine the economic and social factors influencing the NEET rate among both male and female populations. The study seeks to highlight the extent to which labour market flexibility, employment instability, and the recent transformations of the European economy exert differentiated effects on young people according to gender.

The paper is organized as follows: the next section is dedicated to the review of the specialized literature concerning the European Union labour market and the mechanisms underlying occupational exclusion. The analysed literature highlights the existence of diverse approaches regarding the effects of labour market flexibility, digitalization, atypical employment, and recent economic transformations on occupational integration, follows by different comparative studies on employment regimes and the structural differences among European economies. The third section focuses on the data and methodology employed in the research. The study relies on a panel comprising the 27 member states of the European Union over the period 2018–2023, while the selected indicators are intended to capture the economic, occupational, and social dimensions associated with labour market integration difficulties. The fourth section is devoted to the econometric findings, with fourth panel data models (with fixed effects and random effects) that compare the male and the female behaviour on labour market. We analyse the effects of economic, occupational, and social factors on the NEET rate, while also highlighting the structural differences identified between the two analysed categories. The final section concludes the paper,

2. Literature Review

This section reviews the existing literature on labour market dynamics, unemployment, income inequality, and labour market policies within the European Union. Previous studies have identified several economic, social, and institutional determinants that shape labour market outcomes, including education, professional training, but also labour market regulations. The literature also underlines the importance of social inclusion policies and institutional frameworks in reducing unemployment and income disparities among European countries.

Kawecka (2023) identified the determinants of unemployment among young people aged 20–24 in the European Union, for two periods, 2010 and 2020. Using a multiple regression analysis on Eurostat data, the author found that participation in education and professional training, labour market status, as well as

social inclusion, had a significant impact on youth unemployment. The study reveals that there is a decrease of unemployment in majority of country from European Union (19 countries), while eight others recorded an increase of unemployment. Piątkowski (2020) aimed to diagnose trends and conditions on the European Union labour market and to determine whether groups of countries with similar characteristics could be identified despite the existing differences among Member States. Using Eurostat data and applying Ward's hierarchical cluster method, the author identified the country groups with same pattern in labour market. The findings indicate that digital literacy and lifelong learning are the main common characteristics of countries with comparable market structures. Moreover, the author concluded that education and vocational training should be regarded as investments in human capital, rather than expenditures.

In their study, Angelini & Farina (2007) analysed income inequality, as well as the causes of this inequality. Although the process of economic convergence was underway, the authors found that economic growth alone was insufficient to reduce disparities and income inequality. Authors explore the impact of labour force supply and demand and underline the crucial role of labour market institutions to decrease and eventually eliminate income differences among European Union countries. On the other hand, exploring the role of economic and institutional factors to reduce inequality income, Zwysen (2024) showed that income inequality has decreased due to the convergence process across countries. The author noted that institutional changes, together with adjustments in labour supply and demand, have contributed significantly to the reduction of income disparities within the European Union.

Bachmann et al. (2012) decomposed income inequality into several dimensions, such as: age, level of education, gender and examined the income inequality within these groups. The authors show that, in addition to individual characteristics, household characteristics influence income levels. Their findings identified significant variations across European countries and highlighted that the countries with stronger labour market regulations and policies tend to exhibit lower levels of income inequality. Laporšek and Dolenc (2012) analysed flexicurity policies that represent the balance between flexibility and security on the labour market, highlighting that such policies play a main role in improving the economic performance of European Union countries, particularly with regard to employment and labour productivity. The authors showed that countries that successfully implemented a balance between flexicurity and security in labour market stand out by a higher productivity and a lower unemployment. Ghosh et al. (2024) study shows the impact of artificial intelligence (AI) on the labour market, underlining that although the technology is still in the early stages of development, it is already exerting a significant impact on labour market dynamics. The study contributes to understanding how different education and professional training models influence that transition to labour market within the European Union. Furthermore, the authors highlighted that AI will affect different sectors in various ways depending on economic region and the specific characteristics of each labour sector. Eichhorst et al. (2016) examined the labour market segmentation, that describes the division between safe jobs and less secure forms of employment. Following the 2008-2009 economic crisis, European countries launched a lot of labour market reforms, although with mixed results. In some countries, reducing employment protection increased labour market flexibility and created employment opportunities, while in other countries these reforms increased job insecurity and the share of non-standard employment.

Although previous studies have extensively analysed unemployment and labour market inequalities, the gender dimension of NEET status remains underexplored. In particular, there is limited empirical evidence on whether the economic and social determinants of NEET status differ between young men and women. Consequently, this paper aims to identify factors influencing NEET status and to assess their gender-specific effects within the European Union.

3. Data and methodology

In this section we introduce the data framework, describing the sources used, the structure of the analysed panel, and the methodological stages followed in the construction and estimation of the econometric models. The methodological approach was designed to ensure both the statistical validity of the results and the overall coherence of the analysis. The selection of analytical methods was guided by the characteristics of the available data and by the objectives of the research.

The use of a panel comprising the 27-Member States of the European Union over the period 2018–2023 entails a series of specific methodological requirements, including the testing of series stationarity, the identification and treatment of multicollinearity, the selection of an appropriate panel model specification, and the control for heteroscedasticity and autocorrelation. Each of these stages is presented and justified in the following subsections, together with the methodological decisions adopted and their grounding in the specialised literature.

Table no. 1: Models variables

Variables	Data source	Definition
GDP_per_capita_growth	World Bank	Annual growth rate of gross domestic product per capita(%)
FDII	World Bank	Foreign direct investment inflows as a share of GDP(%)
Annual_growth_rate_of_output_per_worker	International Labour Organization	Annual growth rate of output per worker (%)
Long_term_unemployment_male / Long_term_unemployment_female	Eurostat	Share of long-term unemployed individuals, unemployed for more than 12 months, in the total active population, disaggregated by gender (%)
Unemployment_male / Unemployment_female	Eurostat	Unemployment rate among the male and female active population(%)
Risk_of_poverty_male / Risk_of_poverty_female	Eurostat	Proportion of the male and female population with incomes below the poverty threshold(%)
Part_time_employment_male / Part_time_employment_female	Eurostat	Share of part-time employees in total employment, disaggregated by gender (%)
Temporary_employees_male / Temporary_employees_female	Eurostat	Proportion of employees with temporary contracts in total employment, by gender (%)
Part_time_employment_and_temporary_contracts	Eurostat	Aggregate indicator combining part-time employment and temporary contracts, reflecting the overall share of atypical forms of employment within the analysed economy (%)
Gender_employment_gap	Eurostat	Difference between the employment rate of men and women aged 20–64 years (%)
NEET_male / NEET_female	Eurostat	Proportion of young people not engaged in employment, education, or training, calculated separately for males and females (%)
Net_migration	World Bank	— Net migration flow, calculated as the difference between the number of immigrants and emigrants (thousand persons)
Number_of_person_1M_male / Number_of_person_1M_female	Eurostat	Number of persons experiencing very short-term unemployment, below one month, calculated separately for men and women (thousand persons)
Number_of_person_M1_2_male / Number_of_person_M1_2_female	Eurostat	Number of persons unemployed for a period between one and two months, calculated separately for men and women (thousand persons)
Number_of_person_6_11M_male / Number_of_person_M6_11_female	Eurostat	Number of persons unemployed for a period between six and eleven months, calculated separately for men and women (thousand persons)

The research is based on panel data obtained from three main sources — Eurostat, World Bank, and International Labour Organization — covering the period 2018–2023 for all 27 European Union countries. The panel comprises 162 observations and was constructed through the aggregation of economic, occupational, and social indicators disaggregated by gender, selected for their capacity to capture the structural dimensions of labour market integration and exclusion. The list of all variables is introduced in Table no. 1.

Prior to the estimation of the panel models, the stationarity of the time series was tested for each variable included in the analysis, representing a necessary step to ensure the validity of the results and to avoid estimations lacking genuine economic significance. The Maddala–Wu Fisher-ADF test was employed, as it is considered the most appropriate approach for panels characterized by a limited time dimension, given that it does not require homogeneity of unit roots across cross-sectional units and provides more robust results than the Levin–Lin–Chu and Im–Pesaran–Shin alternatives under conditions involving a small number of time periods.

The results of the Fisher-ADF test, confirm that all series included in the analysis are stationary, indicating that their evolution over time is stable and that the relationships among variables can be estimated in a statistically valid manner. This conclusion allows the research to proceed to the subsequent stage, namely verifying multicollinearity and the construction of the final econometric models.

The multicollinearity analysis was conducted separately for the two datasets employed in the research, one dedicated to the male population and the other to the female population, in accordance with the comparative structure of the study. For each dataset, a Pearson correlation matrix was determined in order to identify pairs of variables displaying high correlations that could potentially affect the stability of the estimations. Based on the obtained results and on theoretical criteria concerning the economic relevance of each indicator, redundant variables were removed, while preserving for each model a set of predictors capable of ensuring both adequate coverage of the relevant labour market dimensions and a sufficient degree of independence among the explanatory variables.

The aggregate indicator *Part_time_employment_and_temporary_contracts* was excluded because it substantially overlaps with *Temporary_employees_female*, the two variables recording a correlation coefficient of 0.976. Retaining both variables would have introduced duplicated information into the model without providing additional explanatory power. Among the three variables referring to unemployment duration, only the series corresponding to the 6–11 month interval were retained, while the other two categories — below one month and between one and two months — displayed very high correlations with this variable ($r = 0.838$ and $r = 0.974$, respectively). The longer interval provides a more accurate representation of persistent forms of labour market disengagement, which are particularly relevant to the objectives of the research.

Furthermore, the general female unemployment rate was excluded in favour of the long-term unemployment indicator ($r = 0.919$), as the latter more accurately reflects the structural vulnerabilities of the labour market and is less sensitive to short-term cyclical fluctuations. Finally, the growth rate of output per worker was removed from the analysis in favour of the GDP per capita growth rate ($r = 0.857$), an indicator more frequently employed in comparative literature and more easily interpretable within the European context.

Following the variable selection process, the set of variables retained for the estimation of the model dedicated to the female population includes the following indicators: *GDP_per_capita_growth*, *FDII*, *Long_term_unemployment_female*, *Risk_of_poverty_female*, *Number_of_person_M6_11_female*,

Part_time_employment_female, *Temporary_employees_female*, *Gender_employment_gap*, *Net_migration*, and *NEET_female*.

The male model exhibited similar patterns of informational redundancy to those identified in the female model, with only minor differences in the structure of the correlations. The aggregate indicator *Part_time_employment_and_temporary_contracts* was excluded for the same reason as in the female model, namely that its very high correlation with *Temporary_employees_male* ($r = 0.969$) would have introduced duplicated information without providing additional explanatory power. Among the three variables related to the duration of male unemployment, the 6–11 month interval was retained, while the other two categories — below one month and between one and two months — displayed very high correlations with this variable ($r = 0.875$ and $r = 0.968$, respectively). The same rationale applied in the case of the female model underpinned this decision. The general male unemployment rate was excluded in favour of the long-term unemployment indicator ($r = 0.812$), as the latter more adequately captures structural vulnerabilities and persistent processes of exclusion within the male labour market. Finally, the growth rate of output per worker was removed in favour of the GDP per capita growth rate ($r = 0.857$), for the same reason invoked in the female model, namely the comparability and frequent use of this indicator within the specialised literature.

Following the selection process, the set of variables retained for the estimation of the model dedicated to the male population includes the following indicators: *GDP_per_capita_growth*, *FDII*, *Annual_growth_rate_of_output_per_worker*, *Long_term_unemployment_male*, *Risk_of_poverty_male*, *Number_of_person_6_11M_male*, *Part_time_employment_male*, *Temporary_employees_male*, *Gender_employment_gap*, *Net_migration*, and *Parental_Leave_years*. The dependent variable of the model is *NEET_male*, representing the proportion of young men who are not engaged in employment, education, or training.

For the analysis of the factors influencing the NEET rate, two separate panel models were specified, one for the male population and one for the female population. The separation of the models allows for the identification of the structural differences characterizing male and female occupational integration mechanisms, while also avoiding the informational overlap generated by the simultaneous use of gender-disaggregated indicators.

Within the framework of the research, both Fixed Effects and Random Effects models were estimated in order to capture the relationships between the NEET rate and the economic, social, and occupational factors included in the analysis.

The general form of the Fixed Effects model is the following:

$$NEET_{it} = \alpha_i + \beta_{1,it} + \beta_2 X_{1,it} + \beta_2 X_{2,it} + \dots + \beta_n X_{n,it} + \varepsilon_{it} \quad (1)$$

The Random Effects model can be expressed as follows:

$$NEET_{it} = \alpha + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \dots + \beta_n X_{n,it} + u_i + \varepsilon_{it} \quad (2)$$

Where:

- α - the constant term of the model;
- $X_{1,it} \dots X_{n,it}$ - the economic, occupational, and social variables included in the analysis;
- u_{it} - the random component specific to each country.

The Fixed Effects model aims to control for country-specific characteristics that remain constant over time, relying primarily on the within-variation of the data for the estimation of coefficients. By comparison, the

Random Effects model allows for the simultaneous capture of both temporal variation and the structural differences existing among the analysed economies (Baltagi, 2008). Given the structure of the panel employed, characterized by a limited number of time periods and a larger number of cross-sectional units, both specifications were estimated and compared within the econometric analysis.

To address potential issues related to heteroscedasticity and autocorrelation, HC3 robust standard errors were employed. In addition, the Pesaran CD test was applied to verify the existence of cross-sectional dependence among the panel units, a procedure frequently used in panel analyses involving economically integrated economies exposed to common shocks.

Based on the methodological framework presented, the following section is dedicated to the econometric analysis of the factors influencing the NEET rate within the European Union. In the first stage, the results corresponding to the male population are examined, followed by the presentation of the model outcomes estimated for the female population. The analysis aims to highlight structural differences between the two categories and to identify the mechanisms through which economic, occupational, and social factors exert differentiated effects on labour market integration processes.

4. Results

In this section we intend to identify the economic, occupational, and social factors influencing the NEET rate within the European Union. The analysis is conducted separately for the male and female populations in order to capture structural differences between the two categories and to highlight the ways in which labour market transformations affect occupational integration processes differently depending on gender.

4.1 The panel data regression model results for the male population

Tables no. 2 and no. 3 present the comparative results of the Fixed Effects and Random Effects models estimated for the male population, with the male NEET rate as the dependent variable. For each specification, the estimated coefficients, HC3 robust standard errors, t-statistics, and levels of statistical significance are reported. A dash indicates that the respective variable was not included in the corresponding model specification.

Table no 2: Results of Panel Data Regression Models for male (Fixed Effects and Random Effects)

Variable	Fixed Effects Model (FEM)				Random Effects Model (REM)			
	Coef.	Std.Err	t-stat	Signif.	Coef.	Std.Err.	t-stat	Signif.
Intercept	—	—	—	—	4.2498	1.5167	2.802	**
GDP_per_capita_growth	-0.04	0.02	-2.18	*	-0.04	0.02	-2.33	*
Long_term_unemployment_male	0.57	0.11	5.47	***	0.93	0.14	6.52	***
Risk_of_poverty_male	—	—	—	—	0.28	0.1	2.74	**
Number_of_person_6_11M_male	0.03	0.01	4.66	***	0.02	0.01	3.95	***
Part_time_employment_male	0.29	0.13	2.29	*	—	—	—	—
Temporary_employees_male	—	—	—	—	-0.13	0.04	-2.93	**

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Source: Authors' own computation in RStudio

The choice between the two specifications could not be made using the standard Hausman test, as the two models include different sets of significant predictors, a condition that invalidates the applicability of this test. The decision was instead based on the performance criteria of the two models. The adjusted R^2 of the Random Effects model is 0.424, compared to 0.178 in the Fixed Effects specification. This difference cannot be overlooked and reflects a substantially higher explanatory power of the RE specification.

The FE model identifies four significant predictors, while the RE model identifies five; however, the nature of these predictors differs. The RE model retains male poverty risk and temporary employment, variables with greater structural relevance to the research objectives, whereas the FE model includes part-time employment, which plays a more cyclical role in explaining disengagement from the labour market.

Table no. 3: Results statistics for FE and RE models estimated for the male population

Model Statistics	FEM	REM
Observations	162	162
Countries	27	27
Number of years	6	6
R^2	0.336	0.442
Adjusted R^2	0.178	0.424
AIC	-17.9	28.95
BIC	-2.46	47.48
HQ	-11.63	36.47
Significant predictors	4	5

Source: Authors' own computation in RStudio

In addition, in panels with a limited time dimension, the Fixed Effects model tends to consume a large number of degrees of freedom by estimating individual effects for each of the 27 economies, thereby reducing estimator efficiency and penalising the adjusted R^2 . Consequently, the Random Effects model was selected as the final specification for the analysis of male NEET determinants. The HC3 robust standard errors initially employed do not explicitly correct for this form of dependence, which may lead to an underestimation of standard errors and consequently to biased statistical inference.

Table no. 4: Results of Panel Data Regression Models for male population – Random Effects Model (REM)

Variable	Coefficient	Std. Error DK	t-Stat	Significance
Intercept	4.25	1.46	2.92	**
GDP per capita growth	-0.04	0.04	-1.2	
Long term unemployment male	0.93	0.1	9.33	***
Risk of poverty male	0.28	0.03	9.41	***
Number of person 6 11M male	0.02	0.0016	18.8	***
Temporary employees male	-0.13	0.05	-2.8	**

*Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Source: Authors' own computation in RStudio*

Table no. 5: Results statistics for the Random Effect Model (REM) estimated for the male population

Model Statistics	REM
Observations	162
Countries	27
Number of years	6
R^2	0.442
Adjusted R^2	0.424
AIC	28.95
BIC	47.48
HQ	36.47
Significant predictors	5

Source: Authors' own computation in RStudio

As a result, the model was re-estimated using Driscoll–Kraay standard errors, which simultaneously correct for heteroscedasticity, serial autocorrelation, and cross-sectional dependence (Table no. 4). This approach is considered particularly suitable for panels characterised by a high degree of interdependence among units (Driscoll & Kraay, 1998).

The estimations confirm that four out of the five predictors initially included in the model remain statistically significant after applying the Driscoll–Kraay correction — namely male long-term unemployment, male poverty risk, unemployment duration of 6–11 months, and male temporary employment. The GDP per capita growth rate loses its statistical significance ($p = 0.25$), indicating that its effect on the male NEET rate is sensitive to the specification of standard errors and cannot be considered a robust determinant under conditions of cross-sectional dependence.

The Random Effects model estimated for the male population explains approximately 42% of the variation in the male NEET rate (Adjusted $R^2 = 0.424$) across the 27 European Union member states over the period 2018–2023, identifying four statistically significant determinants that operate through distinct mechanisms influencing overall disengagement among young men. The results of the Random Effects model highlight the existence of significant relationships between the male NEET rate and a range of occupational and social factors. The estimated coefficients indicate both the direction and the magnitude of each variable's influence on the labour market integration difficulties faced by young people.

Long_term_unemployment_male represents the strongest determinant of the male NEET rate identified in the model, with a statistically significant coefficient of 0.93. A one-percentage-point increase in the male long-term unemployment rate is associated with a 0.93 percentage point increase in the male NEET rate, indicating an almost one-to-one effect and suggesting a direct structural relationship between the two phenomena. This result highlights the existence of a persistent labour market lock-in mechanism, whereby economies characterised by structural difficulties in reintegrating individuals into employment tend to simultaneously exhibit higher levels of male NEET populations. It suggests that the core issue is not solely the lack of available jobs, but rather the limited capacity of economic systems to reintegrate individuals from NEET status back into the labour market.

The positive coefficient associated with the variable *Risk_of_poverty_male* ($\beta = 0.28$) indicates that a one-percentage-point increase in the poverty risk among the male population leads to an approximate 0.28 percentage point increase in the NEET rate. This result highlights a direct relationship between social vulnerability and labour market disengagement. More importantly, the finding suggests that the male NEET rate does not reflect solely occupational difficulties, but also deeper processes of social and economic marginalisation. In other words, poverty and NEET status appear to reinforce each other: poverty limits access to education and training, thereby reducing employment prospects, while labour market disengagement further perpetuates poverty. Young men in poverty are not choosing NEET status, but are rather pushed into it by structural constraints beyond their control.

The variable *Number_of_person_6_11M_male* exhibits a positive and statistically significant coefficient ($\beta = 0.02$). Accordingly, an increase of one thousand persons in this category is associated with an approximate 0.02 percentage point rise in the male NEET rate. The result indicates that occupational vulnerability among men tends to accumulate progressively over time. In other words, as periods of labour market disengagement become more prolonged, the likelihood of reintegration into employment decreases. Moreover, the statistical significance of this variable suggests that this unemployment duration interval does not merely represent a temporary stage of joblessness, but is instead associated with persistent difficulties in labour market reintegration.

The coefficient associated with the variable *Temporary_employees_male* is negative and statistically significant ($\beta = -0.13$), indicating that a one-percentage-point increase in male temporary employment leads, on average, to a 0.13 percentage point decrease in the male NEET rate. This result is particularly relevant as it suggests that, for the male population, temporary employment functions more as a mechanism for maintaining labour market attachment than as a form of occupational exclusion. Although such forms of employment are characterised by contractual instability, they reduce the likelihood of complete withdrawal from the labour market. In this sense, temporary work operates as a primary entry channel into employment for young men. Even precarious and unstable contracts keep individuals economically active, provide work experience, and reduce the risk of full disengagement. From this perspective, policies that restrict temporary contracts in the name of social protection may inadvertently eliminate one of the few mechanisms that effectively reduces male NEET rates outside of overall economic growth.

4.2. The panel data regression model results for female population

Tables no. 6 and no. 7 present the comparative results of the Fixed Effects and Random Effects models estimated for the female population, with the female NEET rate as the dependent variable. For each specification, the estimated coefficients, HC3 robust standard errors, t-statistics, and levels of statistical significance are reported.

The choice between the two specifications could not be made using the standard Hausman test, as the two models include different sets of significant predictors — the Fixed Effects model retains the gender employment gap, female long-term unemployment, and the 6–11 month unemployment duration, while the Random Effects model replaces long-term unemployment with female part-time employment. This structural difference invalidates the application of the Hausman test, which requires identical specifications across both models.

Table no. 6: Results of Panel Data Models for female (Fixed Effects Model and Random Effects Model)

Variable	Fixed Effects Model (FEM)				Random Effects Model (REM)			
	Coef.	Std.Err	t-stat	Signif.	Coef.	Std.Err	t-stat	Signif.
(Intercept)	—	—	—	—	8.81	1.65	5.36	***
GDP_per capita_growth	—	—	—	—	—	—	—	—
Gender_employment_gap	0.51	0.19	2.7	**	0.55	0.15	3.53	***
Long_term_unemployment_female	0.49	0.22	2.2	*	—	—	—	—
Number_of_person_M6_1_1_female	0.03	0.01	2.4	*	0.03	0.01	2.26	*
Part_time_employment_female	—	—	—	—	-0.09	0.03	-2.8	**

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Source: Authors' own computation in RStudio

Table no. 7: Results statistics for FE and RE models estimated for the female population

Model Statistics	FEM	REM
Observations	162	162
Countries	27	27
Number of years	6	6
R ²	0.29	0.313
Adjusted R ²	0.14	0.3
AIC	63.8	111.8
BIC	73	124.2

Source: Authors' own computation in RStudio

The comparison of performance criteria indicates the superiority of the Random Effects model. Its adjusted R^2 of 0.300, compared to 0.138 in the Fixed Effects model, reflects a substantially higher explanatory capacity of the RE specification (Table no. 7). Both models identify three statistically significant predictors; however, the RE model captures an additional relevant mechanism, namely the negative effect of female part-time employment on NEET, a variable with a direct role in female labour market reintegration and higher statistical significance than the variables retained in the FE model.

Table no. 8: Results of Panel Data Regression Models for female population – Random Effects Model (REM)

Variable	Coefficient	Std. Error DK	t-Stat	Significance
(Intercept)	8.8148	2.0169	4.4	***
Gender_employment_gap	0.5465	0.089	6.1	***
Number of person M6 11 female	0.0264	0.004	6.5	***
Part time employment female	-0.094	0.0302	-3.1	**

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Source: Authors' own computation in RStudio

At the same time, a substantial part of the relevant information for the analysis of female NEET rates derives precisely from structural differences across economies, dimensions that are preserved in the Random Effects specification but eliminated in the Fixed Effects approach.

Table no. 9: Results statistics for the Random Effect Model (REM) estimated for the female population

Model statistics	REM
Observations	162
Countries	27
Number of years	6
R^2	0.313
Adjusted R^2	0.300
AIC	111.8
BIC	124.2
HQ	116.8
Significant predictors	3

Source: Authors' own computation in RStudio

Therefore, the Random Effects model was selected as the final specification for the analysis of female NEET determinants, in line with the choice made for the male model and ensuring the methodological consistency of the overall comparative analysis. The Pesaran CD test applied to the female model confirms the presence of cross-sectional dependence ($z = 4.212$), a result consistent with that obtained for the male model and with the high degree of economic integration among European Union member states.

The Random Effects model estimated for the female population explains approximately 30% of the variation in the female NEET rate (adjusted $R^2 = 0.300$) across the 27 European Union member states over the period 2018–2023, identifying three statistically significant determinants.

The variable *Gender_employment_gap* records a positive and statistically significant coefficient ($\beta = 0.54$), indicating that a one-percentage-point increase in the difference between male and female employment rates leads, on average, to a 0.54 percentage point increase in the female NEET rate. This result obtained after the Driscoll Kraay correction highlights that economies characterized by large gender disparities in labour market participation also tend to exhibit higher levels of female occupational exclusion (Table no. 8). In other words, the female NEET rate reflects not only individual integration difficulties, but also persistent structural imbalances between men and women within the labour market. The coefficient captures more than a statistical association; it reflects the broader cultural and institutional environment of the labour

market. Economies with large gender gaps are typically those in which social norms, hiring discrimination, and the absence of adequate work–family reconciliation policies discourage female participation. In this context, high female NEET rates do not represent a voluntary withdrawal from activity, but rather a form of systemic exclusion operating through cultural and institutional mechanisms that are difficult to quantify and address through conventional labour market policies. The results suggest that gender disparities in labour market participation are not merely a secondary effect of NEET vulnerability, but one of the structural mechanisms that both drives and reproduces it over time.

The coefficient associated with the variable *Number_of_person_M6_11_female* ($\beta = 0.02$) indicates that the extension of periods of inactivity or occupational vulnerability within the 6–11 month interval contributes to an increase in the female NEET rate. A rise of 1,000 persons in this category is associated, on average, with an approximate 0.02 percentage point increase in the NEET rate. The result suggests that female occupational vulnerability has a cumulative character, whereby longer interruptions in professional activity make labour market reintegration progressively more difficult. The 6–11 month interval also appears to represent a critical threshold of discouragement, marking the point at which cyclical unemployment risks transitioning into structural exclusion.

However, when compared with the male model, the underlying mechanism differs. Men affected by prolonged unemployment tend to withdraw completely from job-search activity, whereas women in similar situations may have access to alternative forms of engagement, such as part-time work, informal economic activity, or caregiving responsibilities, which keep them partially active while removing them from official employment statistics. This helps explain why the effect is present but less dramatic than in the male case.

The variable *Part_time_employment_female* exhibits a negative and statistically significant coefficient ($\beta = -0.09$), indicating that a one-percentage-point increase in female part-time employment is associated with an approximate 0.09 percentage point decrease in the female NEET rate. The result suggests that, regardless of their contractual nature, part-time employment arrangements function in the case of the female population as a mechanism for maintaining labour market attachment and reducing the risk of complete withdrawal from occupational participation. Economies that provide broader opportunities for part-time work appear to sustain female participation in the labour market even in periods when full-time employment is not compatible with family responsibilities.

These findings raise important questions regarding the indirect effects of restricting flexible forms of female employment on the NEET rate, suggesting that overly restrictive regulation of part-time work may generate unintended consequences for female participation on the labour market.

5. Discussions

Regarding the NEET model for male population, the results indicate that the male NEET rate is driven by a relatively limited number of factors, but with strong and direct effects on young men's labour market participation. Structural unemployment, poverty, and unemployment duration act as exclusionary forces, while temporary employment operates as an inclusionary mechanism.

Effective policies aimed at reducing male NEET rates should therefore focus directly on reintegrating the long-term unemployed and preserving labour market flexibility through temporary contracts, rather than restricting it. The data suggest that, in the case of young men, the central issue is not necessarily the existence of unstable jobs, but rather the complete loss of attachment to the labour market. In other words,

precarious or temporary employment still functions as a mechanism that maintains individuals within the economic system, whereas long-term unemployment generates a gradual process of labour market exit.

At the same time, the combination of the very high coefficient associated with long-term unemployment and the positive effect of poverty risk suggests that the male NEET phenomenon does not solely reflect an occupational issue, but rather the emergence of a cumulative cycle of marginalisation. In economies characterised by high social vulnerability, prolonged periods of inactivity tend to generate persistent effects on labour market integration.

Taken together, the results reveal the existence of a structural imbalance between the mechanisms that foster labour market exclusion and those that support continued participation in employment. The magnitude of the effects associated with persistent unemployment and social vulnerability is substantially higher than the protective effect exerted by temporary employment. This finding suggests that policies relying exclusively on promoting labour market inclusion may have limited effectiveness in the absence of simultaneous measures aimed at reducing structural unemployment and male social vulnerability.

At the same time, the fact that temporary employment is associated with a reduction in the male NEET rate raises important questions regarding the indirect effects of excessively restrictive regulations on flexible forms of employment. The results indicate that, in the case of the male population, even forms of employment characterised by contractual instability can function as mechanisms that maintain labour market attachment and prevent complete withdrawal from economic activity. The overall interpretation of the model highlights the existence of a significant difference between the factors that reduce male occupational vulnerability and those that intensify it. The results suggest that the male NEET rate reflects not only temporary difficulties in professional integration, but also the presence of structural mechanisms of marginalisation that tend to become self-reinforcing over time.

Regarding the regression models estimated for the female population, the results show that the female NEET rate does not appear to be driven primarily by labour market fluctuations or by conventional macroeconomic factors, but rather by the continuity and stability of women's participation in economic activity. This is reflected in the combination of coefficients for the gender employment gap and part-time employment, which emerge as the central variables of the model, while standard unemployment indicators are not statistically significant.

The gender employment gap creates the structural context in which periods of occupational vulnerability become more likely and more difficult to overcome for women. It captures not only a statistical difference between men and women, but also deeper structural features of labour market organisation and the distribution of social responsibilities. Economies with large gender gaps tend to exhibit higher female NEET rates even when overall economic performance is favourable. This suggests that the issue is not the lack of jobs, but rather the fragility of mechanisms that enable women to remain continuously active in the labour market.

Within this context, the negative effect of part-time employment gains particular significance. Part-time work does not reduce female NEET because it represents an ideal form of labour market integration, but because it functions as an adaptive mechanism in a system where labour force participation must be reconciled with predominantly female caregiving responsibilities. The results indicate that, for the female population, employment continuity matters more than contractual quality: even flexible forms of employment significantly reduce the risk of complete withdrawal from the activity.

The results of the model suggest that the female NEET rate functions more as an indicator of the fragility of women's labour market participation than as a conventional measure of unemployment. The central issue is not the lack of jobs, but the difficulty of maintaining stable and continuous participation in the labour

market. As long as the gender employment gap remains high, policies focused exclusively on stimulating employment are likely to have limited effects.

6. Conclusions

This paper examined the economic and social determinants of NEETs rate in the European Union, highlighting the gender differences in labour market behaviour. The findings suggest that factors driving NEET status differ significantly between young men and women. For men, NEET status is mainly associated with structural unemployment, poverty risk and long-term unemployment, showing cumulative mechanisms of social and labour market exclusion. For women, the NEET determinants are less related to conventional labour market indicators. The gender employment gap increases the risk of becoming a NEET, while the part-time employment functions as an adaptive instrument to reconcile work and caregiving responsibilities.

Overall, the research suggests that NEET status is a gender specific and multidimensional phenomenon. Consequently, European Union policies aimed at decreasing the NEET rates should adopt a gender-specific approach, focusing on reducing structural unemployment and social vulnerability among men, while promoting gender equality and flexible employment opportunities for young women.

Future researches will include other vulnerable categories in the analysis, like the elderly, the low-income individuals, prisoners, the homeless, racial and ethnic minorities, and those lacking health insurances.

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