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The regional dimension of overeducation two decades after Poland's accession to the European Union

Abstract
In this study, we investigated regional variation in overeducation in Poland almost two decades after its 2004 EU accession. Using microdata from the Labour Force Survey and applying the realized matches method, we found that approximately 20% of workers in Poland have education levels exceeding job requirements, with younger workers under 35 experiencing even higher rates (24%). While the overall level of overeducation in Poland remained relatively stable over the analyzed period, a growth of regional differences in the incidence of overeducation was observed. Less economically developed regions of eastern and central Poland are characterized by a substantially higher risk of overeducation than western and southern regions. Gender disparities have been observed, with overeducation decreasing among women while increasing among men. This may suggest that peripheral regions struggle to absorb highly qualified workers despite increasing educational attainment. Such a process may potentially deepen developmental disparities and intensify internal migrations.

Keywords
Overeducation • job mismatch • regional development disparities • gender differences

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Introduction

We may define overeducation as a situation in which an employee's level of education is higher than the level required for their job. In an era of increasing numbers of university graduates, a mismatch between qualifications and market needs can lead to wasted human resources and reduced job satisfaction (McGuinness, 2006; Verhaest & Omey, 2009). Kucel et al. (2011) highlight the key implications of this phenomenon for countries in economic transition. This includes Poland after EU accession, where the education boom has not always been aligned with economic development, enabling the absorption of highly skilled human resources, especially in peripheral regions.

Poland's two decades of EU membership have brought fundamental changes in employment structure, wage levels, and competence requirements for employees. During the transition period, Poland experienced an unprecedented increase in higher education enrolment. The mass character of higher education, with the varied quality of the educational offer and the limited ability of the labour market to absorb the growing number of graduates with higher education, created the basis for changes in the economic value of an academic diploma. Wage premium erosion and overeducation have been observed in many developed countries and have also become a key research focus in Poland.

In this study, we aimed to analyse the regional variation of overeducation in Poland between 2004 and 2023. With high-skilled jobs usually concentrated in regions with large agglomerations, overeducation is a challenge, particularly for regions with a lower level of economic development. The paper consists of five sections that elaborate on the regional dimension of overeducation in Poland. Following the introduction, the second section discusses the theoretical aspects of overeducation, including human capital theory, signalling theory, and regional development concepts. The third section presents our methodological approach, focusing on the realized matches method used with the Labour Force Survey data from 2004 and 2023. The fourth section presents our empirical findings, revealing substantial regional disparities in overeducation rates, with eastern and central regions demonstrating substantially higher rates than western and southern regions with large academic centres. The final section summarizes our findings, discusses its policy implications, and identifies limitations and directions for future research.

Theoretical Foundations of Overeducation

Overeducation is one of the forms of vertical skill mismatch. It refers to a situation in which a worker has a higher level of formal education than is required for their occupation (Green & McIntosh, 2007). Freeman (1976) was the first to draw attention to the problem of overeducation in the context of the labour market in the USA, introducing the concept into labour economics.

At the individual level, overeducation is often associated with lower earnings compared to individuals with the same level of education enjoying matched employment. Allen & van der Velden (2001) estimate that the wage penalty from overeducation is on average equal to 15–20%. In Poland, Wincenciak (2016) estimated a wage penalty of 14–16%. This is also associated with lower job satisfaction (Verhaest & Omey, 2009) and higher levels of stress and burnout risk (Maynard et al., 2006). At the macroeconomic level, excess education implies inefficient allocation of human

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resources and wasted investment in education. McGuinness (2006) suggests that in developed countries, economic loss resulting from overeducation may be equal to 2–3% of GDP per year. Mavromaras et al. (2013) further indicate that vertical mismatch can hinder economic growth by reducing labour mobility.

According to human capital theory, investment in education should translate into increased productivity and wages (Becker, 1964; Mincer, 1974). In the light of this theory, overeducation may occur when changes in the structure of the economy increase the valuation of tertiary qualifications, encouraging mass uptake of education. However, it is expected to be transitory. This theory assumes that the labour market correctly values human capital, which contradicts the persistent overeducation observed in empirical studies (Dolton & Vignoles, 2000). In contrast, the signalling theory developed by Spence (1973) and Arrow (1973) claims that education does not increase productivity, but it provides a signal to employers about a worker's potential capabilities. Following this approach, overeducation may be the result of competition for jobs through the acquisition of higher and higher formal qualifications, even if these do not directly lead to higher productivity (Bills, 2003). As noted by Stiglitz (1975), the asymmetry of information in the labour market promotes qualification inflation. Meanwhile, Thurow (1975) proposed a model of competition for jobs in which education determines a candidate's position in the employment queue. According to this theory, employers prefer candidates with a higher level of formal education because their training costs are lower. The consequence is a qualification spiral – workers invest in education to improve their position in the queue. This leads to diploma inflation (Brown, 2001). The assignment theory proposed by Sattinger (1993) assumes that productivity and wages depend on the degree of the match between the worker's skills and the job requirements. Overeducation is the result of imperfections in the process of allocating workers to jobs. McGuinness & Sloane (2011) highlight that skill mismatches can be more costly than overeducation alone. Occupational mobility theory (Sicherman & Galor, 1990) interprets overeducation as a strategic decision by workers to accept positions below their qualifications to gain the experience and skills needed for further career. A longitudinal study by Baert et al. (2013) partially confirms this hypothesis. However, this indicates that for many workers, overeducation is relatively permanent and not a transitional phase.

Regional variation in the scale of overeducation can be explained based on several theories. The theory of spatial segmentation of labour markets (Moretti, 2011) suggests that regions with a less diversified economic structure offer fewer opportunities to match qualifications with jobs. Büchel & van Ham (2003) suggest that the limited spatial mobility of workers, especially in peripheral regions, increases the likelihood of under-qualified jobs. According to development polarisation theory by Myrdal (1957), less developed regions experience a 'brain drain' while offering fewer skilled jobs. This, in turn, leads to the paradox of the co-occurrence of skills shortages and surpluses. Meanwhile, structural mismatch theory (Acemoglu & Autor, 2011) indicates that regions with lower levels of technological development generate demand for a different type of qualification than those offered by an education system oriented towards national or global standards. The magnitude of overeducation in regions can also be explained by the concept of social capital (Putnam, 2000) – regions with weaker social networks and lower levels of trust are characterised by less effective matching mechanisms in the labour market. This favours an increase in overeducation.

Methodological Approach: The Realized Matches Method in Regional Analysis

Although conceptually intuitive, overeducation poses a considerable methodological challenge for labour market researchers (Chevalier, 2003). The diversity of approaches to measuring overeducation leads to varying empirical results, making it difficult to compare studies and to draw clear conclusions about the extent of the phenomenon (Groot & Maassen van den Brink, 2000).

Hartog (2000) differentiates between three main methods for measuring overeducation, that is, the normative method based on an analysis of occupational requirements; the statistical method, using the deviation from the prevailing level of education in each occupation; and the subjective method, based on workers' self-assessment. The diversity of methodological approaches affects estimates of the scale of the phenomenon, as highlighted by Leuven & Oosterbeek (2011) in their review of empirical studies, as well as an analysis by Quintini (2011).

The following analysis uses the method of realised matches, that is, a type of statistical method. This involves identifying for each occupational group the dominant level of education, often measured as a modal or median, and considering workers with higher levels of education as overeducated. This method considers the structure of the qualifications within the population of employees. It also allows for changes over time in typical matches, which can indicate technological and organisational changes. The method requires relatively easily accessible data, available in most labour force surveys.

However, this method is relatively highly sensitive to sample size. It can also lead to a self-fulfilling prophecy – if a profession systematically employs workers with excessive qualifications, the method of realized matches will not identify it as overeducation. In the context of studying the regional variation of overeducation in Poland between 2004 and 2023, the method of realised matches seems to be the most appropriate for several reasons. Firstly, the period of analysis covers substantial structural changes in the Polish economy related to the post-communist transition and European integration. By adapting to the current structure of qualifications in the labour market, the method of realised matches allows us to capture these changes without having to rely on external classifications that may not keep up with dynamic economic transformations. Data from the Labour Force Survey (LFS) for 2004 and 2023 provide a sufficiently large sample for the application of this method, minimizing the problem of small numbers for individual occupational categories in regional cross-section. This method allows for an analysis of changes over time.

Regional Patterns of Overeducation: Empirical Findings for 2004 and 2023

In this study, we used microdata from LFS for two points of time, that is, 2004, representing the moment of Poland's accession to the European Union, and 2023, (almost) two decades later. The LFS is a representative survey of households conducted by the Central Statistical Office following the methodology of the International Labour Organisation (ILO) and Eurostat standards, which ensures temporal data comparability (CSO, 2023).

The research sample comprised working populations who answered the question on the occupation of their main job. This procedure allowed the precise identification of the occupational groups necessary to apply the method of realised matches. For the 2004 data, a sample of 81,437 respondents was used. Meanwhile, for 2023, data on 82,004 individuals were included in the analysis.

Our analysis uses the classification of occupations and specializations (KZiS), which is the Polish adaptation of the International Standard Classification of Occupations (ISCO). For this study, three-digit occupational groups were used, which seemed to be the most suitable compromise between adequate detail and maintaining an appropriate number of individuals in each group.

Vol. 29 • No. 4 • 2025 • pp. 241-246 • ISSN: 2084-6118 • DOI: 10.2478/mgrsd-2025-0036

Table 1. Vertical match of education level and occupational requirements for 2004

Voivodship	Number of observations	General population (%)			Men (%)			Women (%)			Individuals aged up to 35 (%)			Difference in overeducation	
		Matched	Overeducated	Undereducated	Matched	Overeducated	Undereducated	Matched	Overeducated	Undereducated	Matched	Overeducated	Undereducated	Women minus men	Individuals aged up to 35 minus general
Dolnośląskie	5027	57.17	19.91	22.92	59.36	22.87	17.77	54.57	16.41	29.03	56.12	24.13	19.75	−6.46	4.22
Kujawsko–Pomorskie	4929	56.66	17.22	26.11	60.42	18.72	20.87	52.15	15.43	32.42	55.17	21.53	23.3	−3.29	4.31
Lubelskie	6201	51.15	20.95	27.9	50.93	22.46	26.61	51.41	19.2	29.39	51.12	27.92	20.95	−3.26	6.97
Lubuskie	3563	57.76	19.2	23.04	59.69	21.64	18.67	55.34	16.13	28.53	55.57	23.31	21.11	−5.51	4.11
Łódzkie	6206	53.9	19.79	26.31	55.79	20.59	23.61	51.64	18.83	29.53	53.24	23.78	22.98	−1.76	3.99
Małopolskie	6656	56.6	21.26	22.15	59.78	22.82	17.4	52.89	19.44	27.67	56.12	25.68	18.2	−3.38	4.42
Mazowieckie	7021	54.44	18.06	27.5	57.37	20.45	22.18	51.16	15.38	33.45	53.88	22.59	23.52	−5.07	4.53
Opolskie	3095	59.06	16.83	24.1	61.33	19.54	19.13	56.32	13.56	30.12	56.59	21.03	22.38	−5.98	4.2
Podkarpackie	5532	55.55	24.17	20.28	57.71	24.96	17.33	53.08	23.27	23.65	55.44	28.25	16.31	−1.69	4.08
Podlaskie	3822	47.46	20.91	31.63	47.63	20.65	31.72	47.24	21.25	31.51	48.56	27.51	23.92	0.6	6.6
Pomorskie	4262	56.8	16.68	26.51	58.83	19.37	21.8	54.22	13.25	32.53	56.59	20.21	23.2	−6.12	3.53
Śląskie	6501	58.13	18.2	23.67	61.86	22.01	16.13	53.76	13.73	32.51	55.16	23.27	21.57	−8.28	5.07
Świętokrzyskie	4240	53.77	22.36	23.87	53.58	24.15	22.27	54.02	20.14	25.85	49.74	30.73	19.54	−4.01	8.37
Warmińsko–Mazurskie	3831	55.36	15.22	29.42	58.4	16.84	24.77	51.46	13.13	35.4	58.34	18.11	23.55	−3.71	2.89
Wielkopolskie	6673	59.42	15.99	24.59	62.85	17.34	19.81	54.99	14.25	30.76	56.67	21.36	21.97	−3.09	5.37
Zachodnio-pomorskie	3878	53.2	17.33	29.47	56.65	19.07	24.28	49.07	15.24	35.69	50	24.08	25.92	−3.83	6.75
Poland	81437	55.47	19.11	25.41	57.78	20.93	21.3	52.7	16.92	30.38	54.42	23.96	21.62	−4.01	4.85

Source: Author's own elaboration based on the LFS microdata for 2004

Regarding the classification of educational levels, a harmonised classification has been developed with five categories, namely, tertiary education, secondary vocational and post-secondary education, general secondary education, basic vocational education and lower secondary education, primary or lower.

The methodology used was based on the method of realised matches. The research procedure was as follows:

1. For each three-digit occupational group and each of the years analysed (2004 and 2023), the frequency distribution of levels of education was calculated.
2. Based on the frequency analysis, the dominant (modal) level of education was identified for each occupational group at both years.
3. For each person in the sample, the qualification match status was determined by comparing their educational level with the dominant educational level in their occupational group. A variable was created taking three values: 1 (baseline category) – when the individual's educational level matched the dominant level of education in that year in the same occupation group; 2 (overeducation) – when the individual's educational level was higher than the dominant one; 3 (undereducation) – when the individual's educational level was lower than the dominant one.

To be methodologically correct, only occupational groups with more than 30 individuals in the LFS sample were analysed to ensure statistical significance in determining the predominant level of education.

To examine the regional variation of overeducation, an analysis was performed for 16 Polish regions (voivodships). For each region, the percentage of individuals with matched, with overeducation and undereducation was calculated in 2004 and 2023 for the total population, for males, females and for those aged up to 35 years. Then, the change in the overeducation rate between 2004 and 2023 was analysed. The results of the calculations for 2004 are shown in Table 1 and the calculations for 2023 are shown in Table 2.

Vol. 29 • No. 4 • 2025 • pp. 241-246 • ISSN: 2084-6118 • DOI: 10.2478/mgrsd-2025-0036

Table 2. Vertical match of education level and occupational requirements for 2023

Voivodship	Number of observations	General population (%)			Men (%)			Women (%)			Individuals aged up to 35 (%)			Difference in overeducation	
		Matched	Overeducated	Undereducated	Matched	Overeducated	Undereducated	Matched	Overeducated	Undereducated	Matched	Overeducated	Undereducated	Women minus men	Individuals aged up to 35 minus general
Dolnośląskie	3310	60.69	16.83	22.48	58.98	21.45	19.56	62.48	11.99	25.53	57.6	16.56	25.83	−9.46	−0.27
Kujawsko–Pomorskie	4930	59.29	17.89	22.82	56.94	23.2	19.86	61.69	12.48	25.83	50.56	22.89	26.55	−10.72	5
Lubelskie	5532	55.93	24.62	19.45	50.92	30.9	18.19	61.19	18.04	20.78	49.3	27.73	22.97	−12.86	3.11
Lubuskie	5222	55.46	19.53	25.01	51.87	26.81	21.32	59.41	11.54	29.06	51.05	22.19	26.76	−15.27	2.66
Łódzkie	3680	57.23	20.03	22.74	54.62	24.26	21.13	60.07	15.43	24.5	48.73	25.98	25.29	−8.83	5.95
Małopolskie	4325	60.67	16.95	22.38	57.79	22.12	20.09	63.83	11.26	24.9	59.54	19.09	21.37	−10.86	2.14
Mazowieckie	10548	61.18	18.04	20.78	56.23	23.62	20.15	66.31	12.26	21.43	53.88	23.23	22.89	−11.36	5.19
Opolskie	4233	57.38	18.88	23.74	56	23.18	20.82	58.82	14.4	26.78	52.76	22.41	24.83	−8.78	3.53
Podkarpackie	5067	60.69	19.95	19.36	57.92	24.17	17.91	63.75	15.27	20.97	62.33	21.29	16.38	−8.9	1.34
Podlaskie	6335	52.83	27.55	19.62	47.49	32.97	19.55	59.2	21.09	19.71	44.14	38.43	17.43	−11.88	10.88
Pomorskie	4004	63.86	15.68	20.45	61.32	19.34	19.34	66.38	12.05	21.56	57.29	20.8	21.92	−7.29	5.12
Śląskie	6878	59.45	16.49	24.06	57.32	21.52	21.16	61.77	11	27.23	55.57	19.48	24.95	−10.52	2.99
Świętokrzyskie	5693	55.3	24.84	19.87	51.35	29.92	18.73	59.56	19.34	21.1	47.26	35.13	17.61	−10.58	10.29
Warmińsko–Mazurskie	4181	57.12	18.66	24.23	52.62	24.18	23.2	61.82	12.87	25.31	52.29	22.41	25.31	−11.31	3.75
Wielkopolskie	4522	61.01	19.02	19.97	58.51	23.52	17.97	63.88	13.86	22.26	58.09	23.01	18.9	−9.66	3.99
Zachodnio-pomorskie	3544	56.97	19.33	23.7	54.58	24.88	20.55	59.51	13.44	27.05	53.82	18.89	27.29	−11.44	−0.44
Poland	82004	58.43	19.82	21.75	55.01	25.05	19.93	62.11	14.19	23.71	53.28	24.13	22.59	−10.86	4.31

Source: Author's own elaboration based on the LFS microdata for 2023

In 2023, 19.82% of respondents had an occupation for which the predominant level of education was lower than the one they had. This was particularly the case for young individuals in the group up to the age of 35, with overeducated individuals comprising 24.1% of the group. These results are comparable to those reported in the earlier studies for Poland (Wincenciak, 2016). On a national scale, despite dynamic changes on the labour market and in the education system, no significant change in the scale of overeducation was observed between 2004 and 2023, neither for the total population nor for young people. However, clear changes were observed by gender. For women, the risk of overeducation decreased, while for men it increased significantly.

In terms of the analysis divided by voivodeship, a few regions stood out where vertical skills mismatch was above average in Podlaskie, Świętokrzyskie, Lubelskie, Łódzkie, and Podkarpackie voivodeships. In the case of the first three, this applies to both men and women. On average, the percentage overeducated in the male group is approximately 11 percentage points higher than in the female group. An even greater difference was observed in the Lubelskie voivodeship, with almost a 15-point difference and the Lubuskie voivodeship with more than a 15-point difference. Everywhere, except for the Lower Silesian and West Pomeranian voivodeships, overeducation affects young people with greater force. On average in the country, the difference amounts to slightly more than four percentage points, except for the Podlaskie and Świętokrzyskie Voivodeships, where it is more than 10 percentage points. This suggests that the structure of education in these voivodeships does not match the structure of demand for labour. Graduates of higher education institutions take up employment, but often in professions requiring lower qualifications.

A comparison of data on the scale of overeducation in 2004 and 2023 across regions shows that, while the intensity of this phenomenon did not change significantly in the country, a differentiation could be observed regionally. Overeducation fell in the Małopolskie, Podkarpackie, Dolnośląskie and Śląskie

Vol. 29 • No. 4 • 2025 • pp. 241-246 • ISSN: 2084-6118 • DOI: 10.2478/mgrsd-2025-0036

voivodeships. Meanwhile, it increased in the Podlaskie, Lubelskie, Warmińsko–Mazurskie and Wielkopolskie voivodeships. In each of these voivodeships, the increase in the frequency of overeducation was only due to a change in the situation of men. In the case of women, the risk of overeducation for women decreased in each of the mentioned regions, which is generally similar for Poland at the national scale.

As regards the specificity of young individuals entering the labour market and particularly at risk of overeducation, the scale of this phenomenon decreased significantly in the Dolnośląskie, Podkarpackie, Małopolskie, Zachodniopomorskie and Śląskie voivodeships. Meanwhile, a relatively large increase in this risk was recorded in the Podlaskie by almost 11 percentage points, Świętokrzyskie and Warmińsko–Mazurskie voivodeships.

When considering factors determining the scale of overeducation, there seems to be a correlation between the level of a region's economic development and the scale of overeducation – voivodeships with lower GDP per capita, namely, Podlaskie, Świętokrzyskie and Lubelskie have higher rates of overeducation. This suggests that there is a limited ability for these regional labour markets to absorb highly skilled workers. There is also a negative correlation between the share of non-public services in employment and overeducation incidence. In the western regions of Zachodniopomorskie and Dolnośląskie, the smaller scale of vertical mismatch may be related to a more diversified economic structure and a higher number of foreign investments. There has been a substantial decrease in overeducation among women in all regions, which may suggest their better educational and professional strategies. In the provinces where strong academic centres are located, including Mazowieckie and Małopolskie, lower overeducation rates are recorded despite a substantial supply of graduates. This indicates a better absorption of qualified workers by the local economy. Meanwhile, the phenomenon of regional polarisation in terms of skills mismatch is intensifying. During the study, the difference between the regions with the highest and lowest levels of overeducation has increased, which may deepen spatial inequalities in economic and social development. The sectoral structure of the economy seems to impact the scale of the mismatch. Regions with a higher share of the service sector show a better match for qualifications than regions dominated by agriculture.

Theoretical Implications and Policy Considerations

The results obtained are partly contrary to Becker's human capital theory. The persistently high level of overeducation, especially in less developed regions including Podlaskie, Świętokrzyskie and Lubelskie, suggests that investments in human capital are not fully reflected in the employment structure. The occurrence of this phenomenon indicates inefficiency in the allocation of resources, both private (outlays on education) and public (financing of higher education). Particularly worrying are the data concerning young people up to 35 years of age who have an overeducation rate reaching 24.1% nationally. In some voivodeships, this level has been substantially exceeded.

The survey results strongly support the assumptions of Spence and Arrow's signalling theory. The persistently high level of overeducation indicates that education functions primarily as a signal to employers rather than a direct driver of productivity. There is a noticeable sign of inflation – as the availability of higher education increases, its signalling value decreases. Regional differences can be interpreted as varying the strength of the signalling effect in local labour markets. In voivodeships with limited absorption of highly qualified employees, for example, Podlaskie and Lubelskie, the signalling effect leads to a greater qualification mismatch. Meanwhile, in regions with more dynamic economies, such as Mazowieckie and Małopolskie, representing a greater correlation with actual competence requirements.

Several implications for public policy can be drawn from the results presented. Voivodeships with a high level of overeducation, such as Podlaskie, Świętokrzyskie and Lubelskie, should identify and support the development of industries that can effectively exploit the potential of highly skilled employees. Policymakers should consider providing investment incentives for companies in the high-tech sectors. The systems for monitoring the career paths of graduates should be improved and conditions created for easier co-operation between universities and employers, enabling faster adaptation of educational programmes to the needs of the labour market. The system of career counselling in secondary schools should be strengthened, emphasising thoughtful educational choices, considering regional employment prospects.

Conclusions

The results of our study confirm that the incidence of overeducation is higher in regions with a lower level of economic development. The voivodeships of eastern and central Poland, that is, Podlaskie, Świętokrzyskie, Lubelskie, Łódzkie and Podkarpackie, are characterized by significantly higher overeducation rates than the western and southern regions, especially those with strong academic facilities, including Małopolskie, Mazowieckie and Dolnośląskie. The correlation between the level of economic development and the scale of skills mismatch suggests the existence of a polarisation mechanism in which peripheral regions, despite the growing level of education of the population, are unable to create enough jobs that absorb available human resources.

A key finding is the clear differences between genders in the incidence of overeducation. The decrease in the scale of overeducation among women, with a simultaneous increase among men, may suggest that women adapt better to the changing conditions on the labour market or are more flexible in adjusting their educational strategies to the real needs of employers. These results make an important contribution to the discussion on the mechanisms of deepening regional differences. This indicates that the differentiating factor may not be only the economic structure, but also the different adaptation strategies of various socio-demographic groups.

The study has some methodological limitations, mainly related to the biased underestimation of the scale of overeducation in professions where overeducation has become the norm. Future analyses should include additional control variables, such as the sector of economic activity, the size of the enterprise, or the location of the workplace concerning metropolitan areas. Longitudinal analyses tracking the careers of university graduates in different regions would also be a valuable avenue for further research, helping to determine whether overeducation in peripheral regions is permanent or rather a transitional stage in a professional career.

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