The Wage Impact of Education and Skills Mismatch: Evidence from Systematic Literature Review

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.915EC005

Received: 31 December 2024; Accepted: 10 January 2025; Published: 11 February 2025

ABSTRACT

Over recent decades, economists have extensively explored the relationship between education and the labour market. This paper offers a systematic review of the 19 selected papers covering the growing literature on the measurement of mismatch incidence and the impact of wages. We discover that the different models substantially provide different incidence rates. Furthermore, the wage impact significantly affected the individuals with a higher level of education but diverged along the wage distribution. Lastly, the findings suggest a direction and roadmap for future research on the prevalence of mismatch and its implications for wages and distribution among individuals.

Keywords: overeducation, undereducation, overskilling, underskilling, wages

INTRODUCTION

Education and Skills Mismatch

Education is crucial in equipping individuals with the skills necessary for personal development and employment and contributing to the broader economy and society. According to Barro (2001), there is a broad consensus that education is essential for individuals, firms, and society to earn various economic, social, and cultural benefits. Barro (2013) also asserts that the government should prioritise human capital development to boost economic growth, measured by improved societal educational attainment. In a rapidly changing world, where new industries emerge and others become obsolete, the role of education in providing relevant skills is more important than ever. It helps ensure that the workforce can adapt to new demands and technologies, fostering resilience in economic shifts and labour market changes.

Due to its importance, most countries have increased their investment in developing their education system. The increase in education investment has resulted in the rising supply of highly qualified labour in most countries (Verhaest & Omey, 2010). However, the expansion of higher education has sparked a growing debate about the significance of the return of education and the ability of the labour market to match individuals with compatible jobs (Capsada-Munsech, 2019; Quintini, 2011). According to Dolton & Vignoles (2000), McGuinness (2006) and McGuinness et al. (2018), the return on education investment depends highly on whether educated individuals are employed in jobs that match their education level.

The study of mismatch, mainly education mismatch, is not new in labour economics, and the literature has grown over the last 45 years. The starting point in the academic literature on education-job mismatch can be found in Freeman's (1976) study of the decreased wage returns for college graduates in the United States. Freeman (1976) incorporates such declining levels with an excessive surplus of graduates, generating an overeducation or vertical mismatch phenomenon. Then, Duncan and Hoffman began their study in 1981. Their study investigated the job mismatch by focusing on the workers' education and the required education (Duncan & Hoffman, 1981).

Generally, a mismatch exists when an employed individual's education level does not conform to the level required to perform the job. It indicates that workers have more or fewer years of education than the job

requires. Therefore, the gap between the labour market's requirements and an individual's education level constitutes an education mismatch (Lee & Sabharwal, 2016; Quintini, 2011). The International Labour Organisation (ILO) (2018) has classified employed persons as matched and mismatched. A mismatched individual can be categorised into two types, either mismatched by qualifications (education mismatch) or by skills (skills mismatch).

Education mismatch exists in the form of overeducated or undereducated. When the employed individual's level of education is higher than necessary to perform his or her job, the individual is considered overeducated. This education mismatch adversely impacts workers because their institutions underutilise and limit the usage of their education and skills. Therefore, they receive minimal wages below what they are supposed to earn based on their level of education. Bol, Eller and Werfhorst (2019) supported this argument, saying that individuals may receive lower wages since they cannot be paid for their excessive knowledge.

The second form of education mismatch is undereducation, where workers have less education than their jobs require. It affects the job and the firm because the workers do not perform adequately to their job requirements. The wage effect of undereducation is that employers pay low wages to their workers, thus affecting the economy as a whole. According to Sloane and Mavromaras (2020), overeducation and undereducation impact the economy adversely and contribute to lower worker wages. Thus, undereducation can be regarded as a problem for academic institutions, while overeducation demonstrates a problem in the labour market.

On the other hand, skill mismatch refers to a situation where a person occupies a job whose skill requirements do not correspond with their skills. Cedefop (2014) describes skills mismatch as a skills imbalance that does not correspond to labour market needs. It can come in two forms: overskilling or underskilling. An employed individual may experience overskilling when the skills exceed those required to perform the job. Overskilling refers to the worker's belief that they possess more skills than their current job requires. In contrast, underskilling describes the worker's situation in that they believe their current skills are less than the job's demands.

Among the earliest theories that discussed education mismatch was Becker's human capital theory. He assessed how individuals made educational investments and the impact of the investment on productivity, return on education and individual wages (Becker, 1964). Many researchers have agreed on the importance of education investment and human capital development and their contribution to economic growth. Therefore, there has been an increase in education investment globally, which implies an increasing number of graduates pursuing higher education to obtain a higher return on education in the form of higher wages in line with the level of education or qualifications obtained.

Mismatch, either in education or skills, is a persistent and prevalent issue that influences people, industries, economies, and societies and significantly impacts the labour market outcome for individuals. A mismatch means poor utilisation of human capital and can result in high economic and social costs for employees, employers and the community if the problem continues. At the firm level, a mismatch can affect the loss of efficiency, increased absenteeism, higher employee turnover, lower growth and less innovation for employers. For the individual, mismatch implies wasted education costs since skills that have not been utilised can contribute to the loss of skills and a waste of resources to develop established skills.

Considering the potential economic losses associated with underutilising skills and education, the issue is inevitable. Therefore, there is a question of the extent to which education and skills mismatch exist in the labour market. Moreover, how will education and skills mismatch impact the wages earned by the employees? We address these questions through three sub-questions: (a) How are education and skills mismatches defined and measured? (b) To what extent is education and skills mismatch observed? (c) Does the education mismatch (overeducated and undereducated) and skills mismatch (overskilled and underskilled) result in lower wages than matched workers? We answer these questions using a systematic literature review on education and skill mismatch.

This study aims to provide an overview of current knowledge about education and skill mismatches and their impact on wages. This paper will proceed in the following manner. Section 2 discusses the strategy for conducting the literature search. Section 3 discusses how the literature has identified and measured mismatches

and the wage implications of educational and skill mismatches. Finally, Section 4 identifies the study's main conclusions and recommends future research.

METHOD

Search Strategy

The preferred reporting items for systematic reviews and meta-analyses (PRISMA) were used for our review. We set a series of inclusion criteria for our review to narrow the extensive body of research to a manageable set of studies for a thorough analysis: (a) The study was published between 1999-2024 in peer-reviewed academic journals in English. (b) Empirical studies (descriptive, correlational and experimental) are included, whereas theoretical, conceptual and case studies are excluded. (c) The study deals with an education and skills mismatch implication on wages. Studies focusing on other types of mismatch (field of study) were not retained.

We restrict our search to 1999–2024 since issues regarding education and skill mismatch were extensively highlighted during that period. Moreover, our systematic review is limited to English-language publications due to limited resources and translation facilities. Furthermore, we consider the empirical articles published in peer-reviewed academic journals and do not consider qualitative research methods such as interviews, case studies, or conceptual work. As a result, it provides us with a more comparable body of research, enhancing the quality of our systematic literature review.

Finally, because we are analysing the impact of education and skill mismatch on wages, we limit our search to investigate horizontal mismatch. As a result, we omit studies that focus on other types of horizontal mismatch because they do not address our primary research issue. Instead, we conducted a computerised systematic search considering a combination of search terms or keywords. It includes 'match' or 'mismatch', combined with 'overeducation' or 'undereducation' or 'overskilling' or 'underskilling' and 'employment' or 'job' or 'work' or 'labor' or 'labour' or 'occupation' and 'skill' or 'skills' or 'educational' or 'education' or 'qualification' and 'wages' or 'wage' or 'income' or 'earnings' or 'earning.

The following electronic Web of Science (WOS) and Scopus databases were used to search for the articles. All articles and cited references from every journal included in WOS have been indexed, resulting in the most comprehensive and complete citation network available for confident discovery and trustworthy assessment. Scopus was used to complement missing articles to our search results. Figure 1 summarises the process of selecting relevant studies. WOS initially had 221 articles published between January 1999 and 2024, whereas Scopus contains 135 records. After removing duplicated, non–peer-reviewed, and non–English records, we have 350 studies. As a result of sorting the research by title and abstract, we removed 209 papers that did not match our inclusion criteria. We retain 22 relevant publications after reading the complete text of the articles.

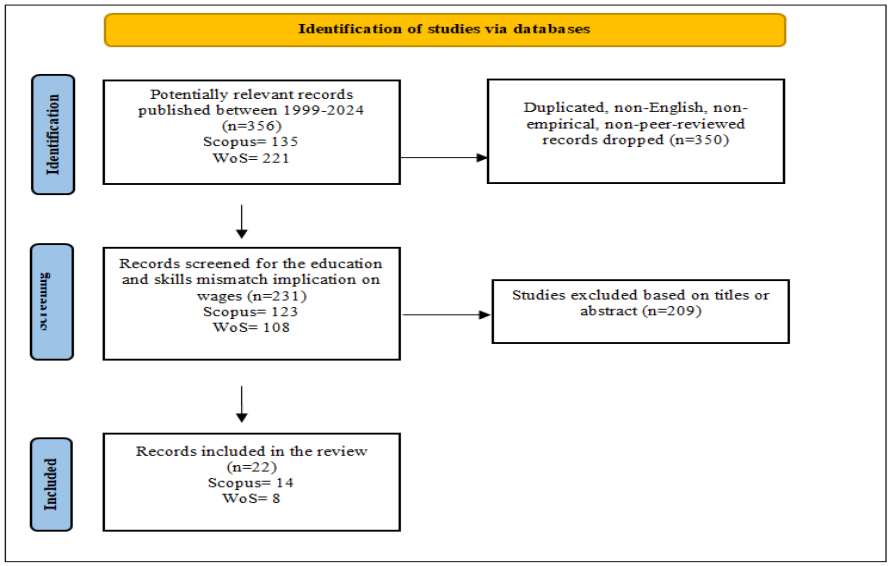

Figure 1. Selection Process Flow Diagram

The articles that met the inclusion criteria were coded according to various factors. First, we documented how education and skill mismatch were measured and the incidence proportion for both forms of mismatch. Moreover, the extracted data includes the publication year, the countries covered, the data type, the year of data collection, the study method, and the sample size. Next, we searched, and each article was independently read and coded. Finally, the differences between the collected results were addressed until a consensus was reached. We also used the search string compatible with our study objectives, as depicted in Table 1.

Five articles were published in Education Economics with a journal impact factor of 0.572, as presented in Table 2. Other than that, most of the articles were derived from the International Journal of Manpower with 3.295 impact factors, Applied Economics Journal with 2.2 impact factors and Technological and Economic Development of Economy with 5.656 impact factors as of 2021.

Table 3 briefly describes the five papers with the most citations. The most cited papers cover a wide range of education and skills mismatch issues and their implications on the wages of employees. For example, the most cited papers, with 303 citations by Di Pietro and Urwin (2006), discuss the issue of education and skills mismatch among graduates in the labour market in Italy. Bender and Roche's (2013) papers explain the compelling view of educational mismatch and self-employment among science and engineering field workers and the different impact of earnings between workers with wages and self-employed workers.

Table 1. The Search Strings Used in the Systematic Literature Review

Journal Database	Search string
WoS	TOPIC: (match OR mismatch AND overeducation OR undereducation OR overskilling OR underskilling AND employment OR job OR work OR labor OR labour OR occupation AND skill OR skills OR educational OR education OR qualification)
Scopus	TITLE-ABS-KEY (match OR mismatch AND overeducation OR undereducation OR overskilling OR underskilling AND employment OR job OR work OR labor OR labour OR occupation AND skill OR skills OR educational OR education OR qualification)

Table 2. Record Count and Journal Impact Ratings

No.	Journal	Record count	Journal impact factor 2021
1.	Education Economics	5	0.572
2.	International Migration	1	1.9
3.	International Journal of Manpower	5	3.295
4.	Applied Economics	3	2.2
5.	Technological and Economic Development of Economy	2	5.656
6.	Economics of Education Review	2	2.22
7.	Review of Economic Perspectives	1	0.7
8.	Asia-Pacific Social Science Review	1	0.148
9.	Asian Academy of Management Journal	1	0.655
10.	Frontiers of Education in China	1	1.17

Table 3. List of Most Cited Papers

Author	Title	Journal	No. of citations
Di Pietro & Urwin (2006)	Education and skills mismatch in the Italian graduate labour market	Applied Economics	303
Bender & Roche (2013)	Educational mismatch and self-employment	Economics of Education Review	101
Rubb (2006)	Educational Mismatches and Earnings: Extensions of Occupational Mobility Theory and Evidence of Human Capital Depreciation	Education Economics	73
Mavromaras, Sloane & Wei (2012)	The role of education pathways in the relationship between job mismatch, wages and job satisfaction: a panel estimation approach	Education Economics	62
Mavromaras, Mahuteau, Sloane & Wei (2013)	The effect of overskilling dynamics on wages	Education Economics	59
Salinas-Jimenez, Rahina-Lopez & Murillo-Huertas (2013)	Gender wage differentials and educational mismatch: An application to the Spanish case	Applied Economics	39
Pecoraro (2016)	The incidence and wage effects of overeducation using the vertical and horizontal mismatch in skills Evidence from Switzerland	International Journal of Manpower	35

FINDINGS

Types of Mismatch

A mismatch is a discrepancy between the skills or education required by employers and the skills or education the individuals possess. The concept of education mismatch refers to a situation in which an employed individual's education level differs from the education required for employment. Three distinct measurement methods are employed to gauge overeducation and undereducation: the subjective approach, empirical analysis (realised matches), and job analysis methods.

Conversely, skills mismatch can be assessed through the following methods: i) workers' self-perceived or employers' perception assessment, ii) comparing the skills (overall skills or specific type of skills) possessed by an individual, or iii) comparing the distribution of employment by occupation (as a proxy for a skill used) with the distribution of employment by level of education (as a proxy for skill possessed) as available in the labour statistics dataset.

The early studies in this field emerged during the 1960s and 1970s, coinciding with the expansion of higher education. Studies focused on quantifying the extent of overeducation and undereducation. After many years, the human capital theory has gained prominence. Economists such as Gary Becker developed this theory, which emphasises that education and training are investments that enhance an individual's productivity and earning potential. Education and skills mismatch studies were conducted to understand the implications of human capital investments. During the 1980s to 1990s, the researchers expanded their focus to examine occupational mismatch, which involved investigating the extent to which individuals worked in jobs that were not directly related to their field of study or training. Studies explored how such mismatches affected job

satisfaction and earnings. In recent years, researchers have examined how external factors, such as technological and economic shifts, influenced job markets and the prevalence of mismatched workers.

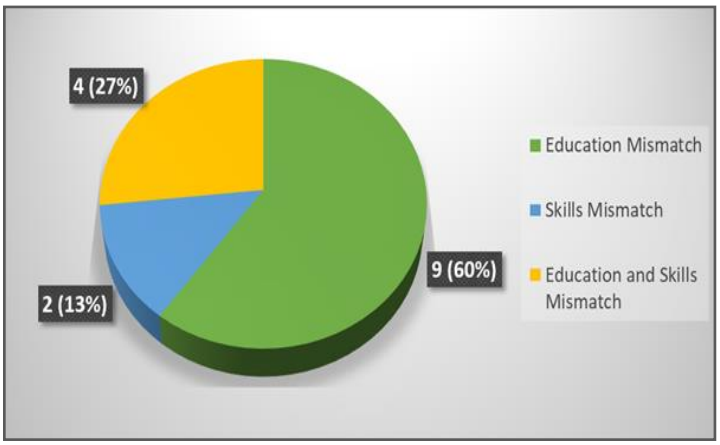

Figure 2. Types of Mismatch Studies

Figure 2 shows the findings of the 15 studies that report the incidence of education and skills mismatch. We identified nine studies measuring education mismatch, two exploring skills mismatch, and another four measuring both incidences. Some countries have been more prominent in the literature due to the prevalence or significance of education and skills mismatch within their labour markets.

Furthermore, Figure 3 shows the periods of articles published over different time frames, from as recent as 2024 back to 2006. This indicates a possible tracking of articles over 18 years, showing that the study of education and skills mismatch is ongoing with contributions from various geographic diversity. There is a noticeable variance in the number of articles published by different countries. Australia leads with five articles over a decade (2012-2024), which could point to a significant level of research activity, funding, or academic output in the country compared to others. Australia also has a well-developed system for education and skills research. We examined the studies related to overeducation and the skills gap, focusing on the impact of immigration on the labour market, which has been the focus of most studies in Australia.

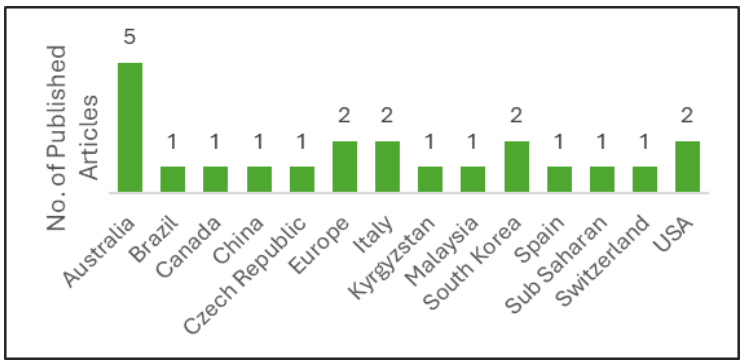

Figure 3. Mismatch Studies by Country

The USA has two articles published over seven years (2006-2013), suggesting a possible trend or activity period that was especially fruitful or relevant for the USA in producing articles. Meanwhile, two articles were also derived from European countries for two years (2013-2024). The collective approach could indicate regional cooperation or a shared initiative encouraging research and publication. Several countries have one to two single publications, such as the Czech Republic, Kyrgyzstan, and South Korea, all within the past few years (2019-2024). This might reflect an emerging interest or development in the respective regions' research capabilities.

In the context of implications for policy and investment, policymakers and investors might be interested in understanding the active hubs of research and publication and possibly adjusting strategies for education, funding, and collaboration to encourage more parity across different regions. It can serve as a point of interest

for researchers and academic institutions to explore collaborations, understand global trends in publication, and potentially identify areas where increased support for research is needed.

Measurement of Education and Skills Mismatch

Subjective Method

The subjective method is generally based on the self-assessment or self-reporting of the workers' education level required to get or do the job. It involves asking individuals or employers to assess their perception of skill gaps or job requirements. It will then be compared to the highest level of education, qualifications, and skills obtained by the workers. The workers are matched if they have a level of education, qualifications, and skills equivalent to that needed. In comparison, they are overeducated, overskilled, undereducated or underskilled if they have a level of education/skills above or below what is required (McGuinness et al., 2017).

The main benefit of the subjective method is that applying survey information is comparatively simple, and it considers the job's heterogeneity as the respondents are familiar with their tasks or jobs. Nevertheless, it is based on subjectivity as the perception differs between individuals. For example, Cohn & Khan (1995) highlighted that workers in less organised organisations might not understand the level required, particularly if such a change does not affect the demands of the job over time and the worker employed before the change. Furthermore, the impression of employees on his education-job matching could also be affected by comparing himself with other employees in comparable employment, leading to a biased perception (Maltarich et al., 2011).

The worker's measurement of the required and possessed skills may be used as a proxy for skill mismatch. The measures are based on workers' self-perceived match between their skills and the skills required for competent job performance. This approach asks employees to what degree they use their skills and knowledge in their jobs or to what extent they feel they need more training to perform their jobs correctly. Allen et al. (2013), Allen & van der Velden (2001), Vieira (2005), Green & McIntosh (2007), Halaby (1994), and Mavromaras et al. (2007) are among the studies that follow this approach. The measurement can also be based on an assessment by the employer or by direct assessment of skills possessed against the skills necessary to carry out the job, and or direct assessment of skill level for selected types of skill such as literacy, numeracy, and ICT tests that may be used (ILO, 2018).

The ILO has also developed a set of questions suitable for collecting information on skill mismatch in Labor Force Surveys. An example of a question to measure the overall skill mismatch using statements such as *"Overall, how would you/… best describe your skills in relation to what is required to competently do your/… job?"*, "*I have the skills to cope with more demanding duties"*, "*My skills are matched to what is required by my job"*, "*Some of my skills are lower than what is required by my job and need to be further developed", or* "*Don't know".*

Objective Method (Realised Matches)

The realised matches (RM) technique is also called the empirical method in the literature. It estimates the distribution of workers' educational levels within each occupation. Two approaches are used to evaluate the mean or modal level of education within a specified occupation and individuals who gained education above (below) the average level as overeducated (undereducated). The main benefit of the realised matches strategy is that it can be readily and easily applied to any current micro datasets containing data about education and occupation. Due to this advantage, McGuinness et al. (2017) emphasise that it can facilitate cross-country comparisons.

However, the realised matches method does not contain any information on the actual skill requirements of the job, and it reflects the average credentials of all workers in a given job. Therefore, it is more closely related to the level of education required than doing a given job in contemporary terms. Furthermore, owing to sample size limitations, the mode education level is typically obtained for broad occupational organisations and not at

an individual work title level. Therefore, it may hide the variance in qualification needs across employment categorised within the same broad occupational category.

In the meantime, skills mismatch can also be measured by using the RM approach. It includes quantifying skills mismatch using methods like the standard RM approach. This method assesses whether an individual's actual skills, qualifications, and job tasks align with what would be expected based on their education, training, or previous work experience. The distribution of skill levels for each occupation is calculated, and workers who deviate from the mean or mode by more than a specified value (generally one or two standard deviations) are classified as over or underskilled. The realised matches method provides a practical way to examine skills mismatches by focusing on individuals' actual skills and qualifications in their current job roles. It can help policymakers, researchers, and employers make informed decisions to address skills gaps and improve labour market outcomes.

Objective Method (Job Analysis Method)

The job analysis method is based on the assessments of professional job analysts who measure the education requirements of occupations to construct occupational dictionaries such as DOT or O*NET in the US or SOC in the United Kingdom (McGuinness et al. 2017). The benefit of using this method is that it is more precise based on field expertise. However, the work assessment technique is costly and not commonly accessible domestically. Moreover, occupational requirements may change quickly over time, implying that the strategy may become outdated if the assessment is not updated regularly (Verhaest & Omey, 2012). Finally, even though classifications are based on expert views, the classification strategy will also require subjectivity.

Besides, education mismatch (overeducation and undereducation) and skill mismatch (overskilling and underskilling) can also be identified using the International Standard Classification of Occupation (ISCO). Significant occupational groups can be categorised by level of education following the International Standard Classification of Education (ISCED). For instance, ISCO categorises lawmakers, senior officials, and executives to require a tertiary (ISCED 5–6) education level. As (Quintini, 2011) stated, this measure assumes that all workers with similar titles require the same amount of education.

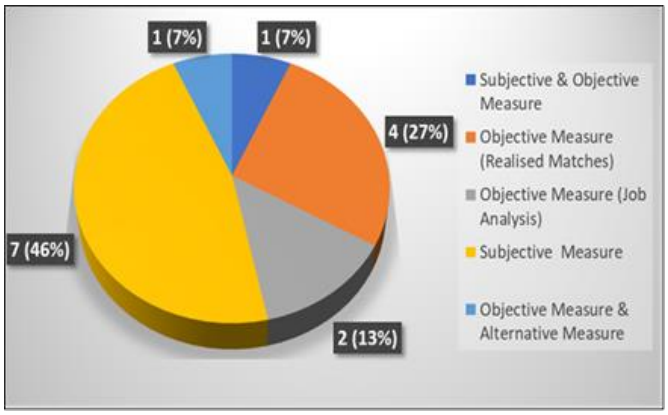

Figure 4: Measurement of Education and Skills Mismatch

Since Freeman's seminal work in 1976, one of the main questions around the overeducation incident has been measuring it. Based on the review (Figure 4), the mismatch incidence has been used in three approaches. The literature identifies seven studies that have used the subjective method to measure the incidence, with two studies measuring the education mismatch and another two measuring the skills mismatch. Meanwhile, three studies use the same method to measure both incidences (education and skills). On the other hand, four studies applied the RM approach, while two used the JA method to measure education mismatch. Finally, only two studies employed a combination of the subjective and RM methods, with one study focusing on education mismatch and another covering both incidences.

The dominance of the subjective measure method suggests that qualitative assessment is highly valued and possibly more critical than quantitative methods. The relatively smaller segments for mixed and alternative measures indicate that these approaches are less conventional or possibly more niche in their application.

Depending on the context, it might be important to discuss the significance of subjective measures that are preferred over objective methods and in what scenarios a combination of different methods might be beneficial. It could also be relevant to explore the implications of having such a high reliance on subjective measures, including potential biases, variability in interpretation, and the challenges of ensuring consistency and reliability.

Incidence of Education and Skills Mismatch

On average, studies that used the subjective method to measure the education mismatch reported around 23.3 per cent to 52 per cent of overeducated incidence. Meanwhile, studies that used RM methods indicated an overeducated incidence of around 28.5 per cent to 42 per cent. However, the RM method utilised mode and the mean approach show different rates. For example, Rubb (2006) reported a 28.5 per cent incidence of overeducation among males when using the mode approach but only 14 per cent when using the mean approach. On the other hand, the highest percentage is shown by Li and Miller (2015) for the study that used the JA method, with 62.6 per cent overeducated incidence reported. Another study that used the JA method utilised two different data sources and measured the incidence based on two sets of interviews. During the first interview, the incidence was 26.5 per cent. However, after the fifth interview, the incidence was reduced to 15.4 per cent. Meanwhile, Karymshakov and Sulaimanova (2019) employed the subjective and RM methods, and the findings show that the subjective method shows a higher overeducated incidence than the RM, with 17.6 per cent and 13.7, respectively.

However, based on the review, only two studies have explored the incidence of skills mismatch, such as those by Mavromaras et al. (2013) and Santos and Sequeira (2013). Both studies used the subjective method to determine the incidence and found around 22 per cent (Australia) to 48 per cent (France) of skills mismatch incidence. Researchers who measured both incidences also concentrated on using the subjective method. For example (Budría & Moro-Egido, 2014a; Di Pietro & Urwin, 2006; Mavromaras et al. 2012). In comparison, (Pecoraro, 2016) measures the incidence by using two approaches: RM (mode) and alternative measure (combination of objective and subjective method).

Wage Impact of Education and Skills Mismatch

Scholars have extensively studied the impact of education mismatch on wages. While there is a consensus that mismatches exist and have consequences on wages, the magnitude and direction of these effects can vary based on methodologies, regional differences, and specific industries considered. An overview of the implications of the wage associated with education and skills mismatch can be seen in Figure 5. Various studies have examined the outcomes, and rising literature has explored the relationships between mismatch and wages. As Figure 5 depicts, most studies assess the impact of education mismatch on wages (19 studies), while only limited studies examine the impact of skills mismatch on wages (7 studies).

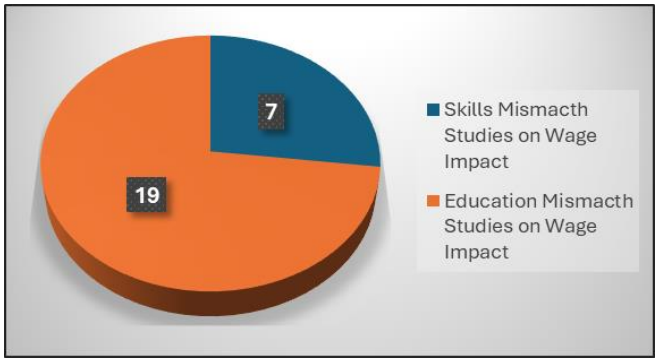

Figure 5. Education and Skills Mismatch Studies on Wages

Most studies used the OLS method to examine the wage impact of education mismatch. Based on the review, the education mismatch (overeducated) among individuals was subject to wage premium (5 out of 22 studies). Besides, findings also point to the wage penalty of overeducated individuals compared to persons who earn the same education in matched occupations, such as in Di Pietro & Urwin (2006), Li & Miller (2015), Sun & Kim (2022),Gaeta et al., (2023)and Manuel (2024). Next, three studies used the OLS method for skills mismatch to determine the wage impact, and the overskilled individuals are subject to wage penalties (Figure 6).

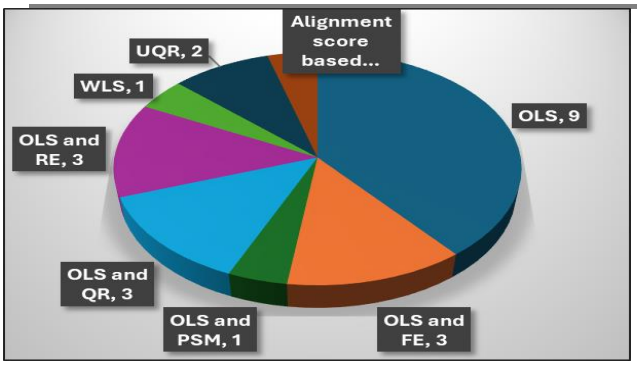

Figure 6. Wages Impact of Education and Skills Estimation Technique

The studies that employed the other method to explore the wage impact include Sedláček & Zelenka (2021), who used weighted let squares (WLS) using the Montt model. The WLS regression results show that the effects of education-job mismatch on relative earnings are statistically significant. The fully mismatched graduates are clearly at a disadvantage where they earn wage penalties due to the overeducation. Overall, the effect of education-job mismatch on relative earnings explains only 3 per cent of the variance in relative earnings of higher education graduates in the Czech Republic.

On the other hand, two studies have employed fixed effect (FE) such as Reis (2017) and Wen & Maani (2018), who examine the education mismatch, while Mavromaras et al. (2012) and Park & Shahiri (2019) have used random effects (RE) and FE to examine the skills mismatch. The FE or RE method shows that overeducated or overskilled individuals are subject to wage penalties. On the other hand, another study by Karymshakov and Sulaimanova (2019), who applied propensity score matching (PSM), showed a different result. For example, they used the objective method to classify the incidence and discover that overeducated individuals are subject to wage penalties. In contrast, they earned wage premiums when the subjective method was used. Based on the review, most studies used the ORU model to explore the wage implications of education and skills mismatch (Figure 7).

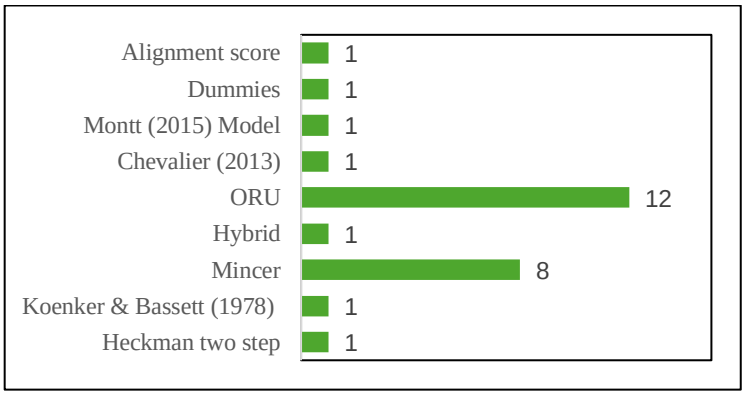

Figure 7. Wage Impact Model

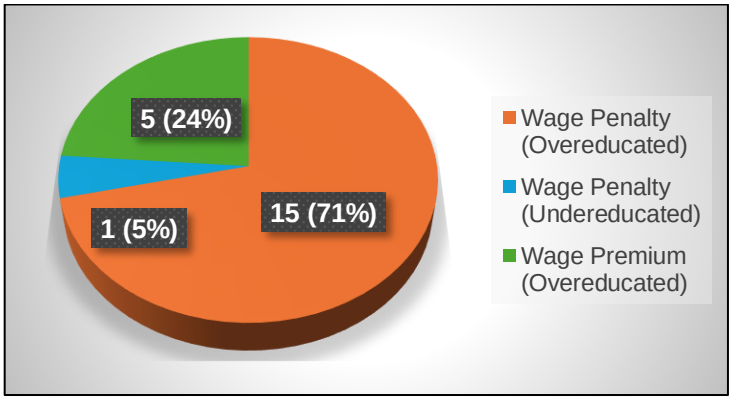

Figure 8. Wage Impact of Education Mismatch on Wages

Furthermore, three studies explored the quantile regression method to determine the wage variation based on individual income. Budría & Moro-Egido (2014) and Maani & Wen (2021) have explored the wage impact of overeducated and overskilled individuals and found that regardless of quantile, both overeducated and overskilled individuals are subject to wage penalties. Meanwhile, Santos and Sequeira (2013) accepted a different finding. It shows different effects of overeducation on individuals' earnings at different points along the earnings distribution. Individuals who are overskilled are subject to wage penalties at the lower quantile of the income distribution, whereas the individual at the upper quantile of income receives a wage premium (Figures 8 & 9).

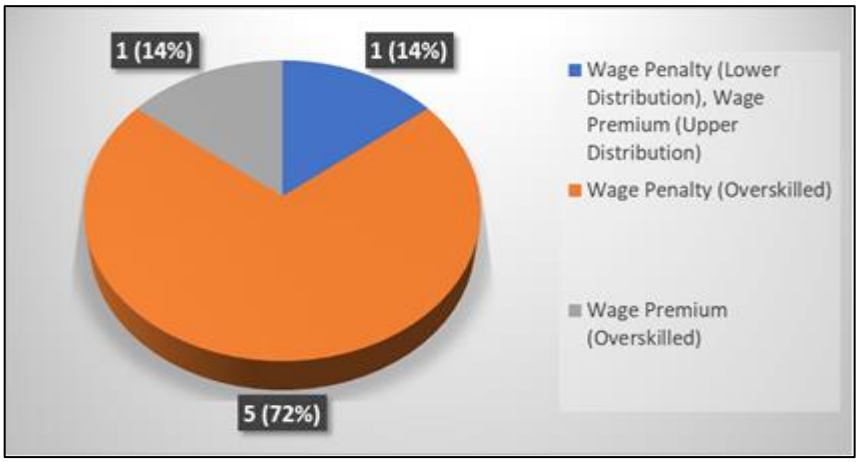

Figure 9. Wage Impact of Skills Mismatch on Wages

In recent years, studies by Sun & Kim (2022) andGaeta et al., (2023) have used Unconditional Quantile Regression (UQR) to explore the wage impact of overeducation across the wage distribution and found that overeducation leads to a wage penalty but the penalty varies depending on factors such as the respondents position within the wage distribution. Meanwhile, a study by Manuel (2024) used the alignment score-based approach to measure the wage impact and found that well-aligned knowledge earns more than those whose jobs are less aligned.

DISCUSSION

Based on a systematic literature review, this paper addresses the prevalence of education and skills mismatch and how it contributes to individual wage implications. In addition, we discussed the approaches in which the concept of education and skills mismatch has been operationalised in prior research and identified its impact on wages, leading to the wage distribution issue.

The issue of mismatch also has a significant impact on wages among labour and its distribution. Various studies and rising literature have explored the relationships between mismatches and wages. For example, Duncan and Hoffman (1981) started their study using a Panel Study and Income Dynamic (1976), which provides national samples of 5,000 households. The models of white men, black men, white women and black women were used. The findings show that 40 per cent of the United States workers had more education than required. It also appears that individuals with the required education earn a higher wage than those who are over or undereducated. Overeducated workers often experience a wage penalty because they cannot utilise their full skills and education in their current jobs, leading to lower wage growth. Conversely, those with the required level of education for their jobs can command a wage premium.

From the other perspective, the level of education serves as a signal to employers about a potential employee's productivity. When workers have more education than their job requires, this signalling effect can be distorted, potentially leading to inefficiencies in wage distribution as employers may over or underpay based on perceived productivity. This will lead to other spillover effects, such as wage compression, where the wage differences between jobs requiring different levels of education become smaller. This can disincentivise further education and potentially distort labour market incentives.

On the other hand, undereducated for their positions may hit a wage ceiling, as their lack of formal qualifications can prevent them from earning higher wages, even if their on-the-job performance is comparable to more educated peers. They also may struggle to perform at the level of their adequately educated counterparts, leading to potential productivity gaps which can influence wages both at the individual and the aggregate level.

Another important area of study related to education and skills mismatch is its impact on wage distribution. The wage distribution issue and inequality have long been essential for economists. In many countries, inequality begins in the labour market. Therefore, changes in pay and wage distribution were crucial factors behind recent trends in inequality. In developed economies, where inequality grew most, this was mostly due to wage inequality and employment losses. For example, in Spain and the United States, where the increase in inequality is between the top and bottom 10 per cent, changes in wage distribution and job losses accounted for 90 per cent of Spain's increase in inequality and 140 per cent of the US increase (International Labour Organization, 2015). In developed countries where household income inequality increases, other sources of income compensate for approximately one-third of the increase in inequality due to wage and employment changes. The important role of wages in household income disparity can be explained by the fact that wages are a major household income source in developed and emerging economies and developing countries (ISSC, IDS and UNESCO, 2016).

Education and skills mismatch situations can lead to inefficiencies in wage distribution, where overeducated workers may not earn as much as they would in a job that matches their qualifications, leading to a potential suppression of wages at the lower end. Undereducated workers may hit a wage ceiling sooner, unable to earn more without additional training or education. When significant portions of the labour force are misaligned with market needs, it can exacerbate income inequality. Overeducated workers often cannot demand wages commensurate with their education, while undereducated workers are limited in wage progression. In addition, the rapid pace of technological change can make certain skills obsolete while increasing the premium on others. Those with high-demand skills, such as technology, can command high wages, whereas those in sectors more prone to automation may see wage stagnation or job losses.

The academic research, including this review, indicated that the education and skills mismatch affected wages. It also affects and influences the distribution of wages in which the wages received by the overeducated or overskilled workers will lead to a wage gap. It will then influence wage inequality, where the return on education will differ across wage quantiles, resulting in wage dispersion (Martins & Pereira, 2004). Therefore, matching education and skills with jobs is becoming significant for entering the labour market. As the mismatch will affect the distribution of wages among individuals in the same group of education, as indicated by Bender & Roche (2013), it is essential to explore the influence of overeducation and overskilling in the distribution of wages to ensure that a policy package can be proposed in dealing with the issue.

Addressing the issue of education and skills mismatch requires comprehensive policy responses that may include education reform to better align with labor market needs, re-skilling programs for displaced workers, and strategic investments in sectors that can lead to more middle-income jobs. Therefore, policymakers and social partners must emphasise their concern in matching the workforce's qualifications and skills with the labour markets' needs to respond to individual wage differences.

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