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Changing economic returns and demand elasticity in higher education

Analytical report

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ABOUT EENEE

EENEE is an advisory network of experts working on economics of education and training. The establishment of the network was initiated by the European Commission's Directorate-General for Education and Culture and is funded by the Erasmus+ Programme. PPMI is responsible for the coordination of the EENEE network. More information on EENEE and its deliverables can be found on the network's website www.eenee.eu. For any inquiries, please contact us at: eenee@ppmi.lt.

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Analytical report

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Executive summary

This analytical report aims to provide a comprehensive analysis of the available literature on the economic returns on higher education across different regions and demographic groups, both globally and particularly within Europe, as well as some insights into demand elasticity among students. Its objective is to offer insights to inform educational policymaking and strategic investments by the European Commission.

Chapter 1 surveys the key literature on economic returns on education. This covers meta-analyses and broad trends, economic contexts, structural and systemic factors, and the influence of micro- and demographic factors. Chapter 2 examines elasticity in demand for higher education, focusing on how tuition costs affect enrolment rates, and the rise of non-degree credentials. Chapter 3 synthesises the report's findings and discusses policy implications, emphasising tailored educational policies to enhance economic growth and social equity.

Summary of key findings:

- Global Trends: the average private return on education is approximately 10 % annually, with returns on higher education reaching 15.2 %. There are significant regional differences in these rates of return, with returns being higher on primary education in developing countries, and on tertiary education in developed countries.
- Economic volatility: returns on education increase during economic crises but decrease slightly during periods of recovery. Flexible labour markets and low levels of inequality can mitigate the negative impacts on less educated individuals.
- Macroeconomic factors: sustained long-term economic growth correlates with higher economic returns on education due to increased demand for skilled labour. In contrast, declining growth rates often reduce the returns for less educated individuals.
- Vocational vs. general education: vocational education systems tend to yield higher returns due to being better aligned with the needs of the labour market. However, it has been shown that increased participation in education can sometimes lead to "over-education" and the devaluation of qualifications, particularly in Western countries.
- Field of study: returns vary significantly according to the field of study, with degrees in medicine, maths and economics yielding higher returns compared with creative arts and other fields. Technical and scientific education is increasingly valuable.
- Gender differences: women often experience lower returns in some fields but higher returns in others. Factors such as career trajectories and occupational sorting contribute to these variations.
- Socio-economic status: higher education enhances economic mobility for disadvantaged groups, but persistent inequalities necessitate targeted policies to ensure equitable access to educational opportunities.
- Institutional characteristics: returns on education are influenced by the prestige and resources of educational institutions, with graduates from prestigious universities typically enjoying higher earnings. Returns also vary between the public and private sectors, being traditionally higher in the case of the former.
- Non-degree credentials: the rise of micro-credentials and digital badges offers new opportunities for skills enhancement and increased employability. However, challenges remain in integrating these credentials into traditional educational systems and ensuring their acceptance in the job market.

Introduction

In an era of rapid technological advancement and economic uncertainty, understanding the economic returns that can be expected from undertaking higher education has never been more critical. For several decades now, the discourse on the economic returns of education has maintained significant traction, emphasising the critical role education plays in both individual and societal advancement. This analytical report, commissioned by the European Commission, delves into the multifaceted nature of these returns, scrutinising the private and social benefits of education across different regions and demographic groups. The comprehensive analysis presented herein is underpinned by a robust survey of the key literature, offering insights into the global trends, macroeconomic factors and micro-level determinants that influence economic returns from education.

By synthesising recent research and identifying key trends, this review aims to provide a comprehensive understanding of the current state of returns on higher education and the factors shaping its future. Our findings have important implications for policymakers, educational institutions and those individuals making decisions about investing in education in an increasingly complex and rapidly evolving global economy. The present paper begins by reviewing meta-analyses and global trends in returns on education. Its findings indicate significant regional differences in these returns, as well as the impact of economic volatility. Subsequently, it explores:

- the macroeconomic factors that determine returns on education, focusing on differences between countries, the impact of economic growth rates, economic crises, and the influence of global and regional economic trends.
- the various micro- and demographic factors that influence economic returns on education. In addition, this chapter delves into specific country studies, examining how returns on education vary according to field of study, gender, socio-economic status and ethnicity. It also compares vocational and general education across different institutional and sectoral contexts.

Beyond returns on higher education for individuals, this paper also considers the broader societal impacts of education, including improved political systems, innovation and health outcomes, as well as greater social trust. However, the phenomenon of "brain drain" complicates this picture, raising questions as to how countries can retain the benefits of their investment in human capital.

Moreover, the present report addresses the critical issues of "overeducation" and increases in participation in higher education, providing insights into how these phenomena affect the labour market and socio-economic mobility. By exploring elasticity of demand in higher education and the emerging trend towards non-degree credentials such as micro-credentials and digital badges, this analytical report offers a forward-looking perspective on how education systems can adapt in order to meet the evolving demands of the labour market.

In terms of the methodology chosen, a few general issues should be noted in relation to measuring and evaluation, which needed to be addressed to ensure the findings were accurate and comprehensive. Gebel and Heineck (2019) highlight the significance of measurement-related decisions, such as deciding between using years of education completed versus differentiated measures of educational degrees. These authors note a growing body of literature that employs standardised competence test scores as proxies for cognitive skills, capturing both innate and acquired abilities. Measurement of labour

market outcomes also varies, as discussed by Shavit and Müller (2000), who consider hourly, weekly or yearly wages and bonuses, and address the common exclusion of self-employed individuals from studies. Beyond wage returns, empirical studies – such as those by Noelke et al. (2012) and Becker and Blossfeld (2017) – have examined other labour market outcomes such as risk of unemployment, duration of job search, occupational status, social class position, occupational prestige, and career mobility. A multidimensional approach of this kind is crucial for detecting potential trade-offs and complementarities in labour market outcomes.

Causal inference poses another significant challenge when determining the effects of education on labour market outcomes. According to Gebel and Heineck (2019), endogeneity arises because education is a result of self-selection processes, via which individuals choose educational paths on the basis of their expected benefits and costs. Factors such as family background, economic resources and parental motives play critical roles in such decisions, leading to biased estimates if not adequately controlled for. Conventional methods, such as multiple linear regression, attempt to account for these pre-existing differences through control variables. However, as noted by Elwert and Winship (2014), over-control bias can occur when variables influenced by education (such as job characteristics) are included, thereby distorting the estimated causal effects. In addition, unobservable variables can induce a correlation between schooling and the error term, leading to ability and sorting biases. Advanced econometric techniques, such as instrumental variables (IV) and natural experiments, help mitigate these biases. Bhuller, Mogstad and Salvanes (2017) emphasise the importance of using long panel data to provide a more accurate depiction of life-cycle earnings. The cross-national analyses by Andersen and van de Werfhorst (2010) and Hanushek et al. (2015) reveal how labour market institutions and the characteristics of education systems also moderate returns on education.

The literature review conducted for the present report, primarily carried out using Google Scholar and Elicit as search tools, focused on the following:

- Papers published in 2015 or later (although for topics that were of particular interest, less recent papers were also included, still prioritising them on the basis of recency);
- Studies on the countries of the European Union, as well as non-EU OECD countries. However, if literature on emerging topics that were deserving of attention only existed with regard to other geographical areas, these studies were also incorporated;
- Academic literature – but, where necessary, primary data (such as statistical sources, surveys, and other pertinent data repositories) and "grey" literature (i.e. reports, policy papers, government documents, etc.) were also consulted; and
- The primary keywords used were "returns on education" (with the later added caveats of "social returns on education"; "-II- European Union"; "-II- gender/ethnicity/vocational/sector/class/brain drain/migration)", which later led us to an area of literature on macroeconomic factors; as well as "elasticity of demand" (for which we proceeded to search using similar caveats to those used with the previous keyword); and "factors influencing choice of academic degree / discipline".

The ultimate aim of the present report is to inform policymaking by presenting evidence-based findings on the economic returns derived from education, highlighting the importance of tailored educational policies that address the unique needs of different demographic groups and regions. The goal of such research is to foster more inclusive and equitable economic growth through strategic investments in education.

Chapter 1: Survey of key literature on economic returns on education

1.1 Broad trends

As described in further detail in the paragraphs that follow, a comprehensive analysis of global trends in economic returns on education reveals several key factors that influence such returns – particularly in the case of higher education. Notably, returns are often higher in those regions experiencing economic volatility and rapid change, where there is a greater demand for skill adaptation. Across different countries and educational levels, the general trend is that returns on higher education have increased over time, especially in comparison to primary and secondary education. These returns are influenced by various factors, including economic conditions, the specific educational level concerned, and regional characteristics.

Montenegro and Patrinos (2023) provide a global perspective on the economic benefits of education through analysis of a comprehensive dataset of private returns on schooling across 142 economies from 1970 to 2014. They estimated an average private rate of return on schooling of 10 %, with the returns on higher education being 15.2 %. This extensive dataset allows cross-country comparisons, which reveal that higher rates of returns are often observed in regions with greater economic volatility and rapid economic changes, which demand greater skill adaptation.

From a similarly global perspective, Johnes, Johnes and López-Torres (2017) conducted a comprehensive survey of human capital and returns on education, noting that returns on education vary significantly between countries and levels of education, with the rates of return being generally higher in East Asian and Latin American countries than in those OECD countries not located in either of the aforementioned regions. In particular, returns are notably high in sub-Saharan Africa. Primary education typically offers the highest returns in developing regions, while tertiary education provides the highest returns in developed economies. Johnes, Johnes and López-Torres highlight that private returns on higher education have increased relative to those on primary and secondary education, and became higher than for these other levels of education in the 2010s (ibid., p. 3).

Zooming in on a series of country-specific studies, Flannery and O'Donoghue (2017) investigate the returns on tertiary education in Ireland, finding significant positive returns for both individuals and the state. For individuals, tertiary education not only increases gross earnings but also contributes to higher measures of happiness and health. For the state, the economic returns include higher tax revenues and reduced reliance on social welfare programmes. These findings highlight the multifaceted value of investments in higher education.

Argan, Gary-Bobo and Goussé (2023) investigated returns on education in France, finding that the expected real wages commanded by some higher-education degrees have decreased in absolute terms over the past two decades, revealing that those who held certain unobserved types of degree experienced a drop in real wages, while others benefitted from an increase. These findings highlight the heterogeneous nature of returns on investments in education and the potential for an excess supply of graduates to devalue certain degrees. This heterogeneity means that the value of a degree depends not only on its level (e.g. Bachelor's, Master's) but also on unobserved individual characteristics (such as individual ability and field of study) and economic shifts over time. Specifically, research

shows that while some graduates continue to see wage growth associated with their degrees, others – particularly those with certain types of Master's degrees – have seen a decline in real wage. In essence, the paper suggests that while higher education still offers valuable returns, the financial benefits are unevenly distributed. Degrees that are closely aligned with current needs in the labour market, or degrees which are pursued by high-performing individuals, tend to retain or even increase their value. In contrast, other degrees, especially in fields in which there is oversaturation, experience wage stagnation or decline, reflecting how excess supply diminishes value in certain cases.

Vilerts, Krasnopjorovs and Brekis (2017) analysed returns on education in Latvia during and after the economic crisis of 2008-2009. Like those studies mentioned in the previous paragraphs that focused on the impact of economic crises, these authors find that returns on education increased significantly during the crisis and decreased slightly during the subsequent economic recovery. This counter-cyclical effect was evident across nearly all population groups. However, interestingly, returns on education were "generally higher in the capital city and its suburbs than outside the capital city region. Returns were also higher for Latvian citizens than for resident non-citizens and citizens of other countries, but were lower for males and young people."

Staneva, Arabsheibani and Murphy (2022) explored returns on education in four transition countries: Bulgaria, Serbia, Tajikistan and Russia. Their empirical results suggest a remarkable degree of heterogeneity across earnings distributions. Returns on education varied significantly, with higher returns being observed in the upper tail of the distribution in Bulgaria and for females in Tajikistan. These findings indicate that "ability" and education have a synergistic relationship with each other, translating into greater pay differentials.

Adams et al. (2017) examined returns on education and labour market sorting (i.e. the process by which individuals are matched to different jobs, occupations, and establishments based on their education, skills, and other characteristics, influencing their earnings and career trajectories) in Slovenia from 1993 to 2007. Their findings indicate that returns to education are primarily driven by labour market sorting rather than just individual productivity differences. The paper finds that most of the wage premiums associated with education arise from sorting individuals into different occupations, establishments, and job units, rather than from within-job pay differences. Occupational sorting plays a more significant role than establishment-level sorting, with job-level sorting explaining the largest share of the observed educational wage premiums. However, the extent to which sorting influences returns to education varies by education level, with tertiary and general secondary education being more influenced by sorting than vocational secondary education.

Wincenciak, Grotkowska and Gajderowicz (2022) conducted a meta-analysis of returns on education in Central and Eastern European transition economies. They find that returns on education have grown substantially over time, with an average estimated rate of return around 7 % during the period they studied. The study also identified that rising unemployment has a positive impact on returns, but a negative impact on rates of enrolment in tertiary education, indicating the counter-cyclical nature of returns on education in these economies.

Iwasaki and Ma (2021) conducted a meta-analysis to estimate the wage effects of secondary and tertiary education in China. Analysing 1,429 empirical results from 61 studies, they found that returns on both secondary and tertiary education are positive, with tertiary education having a more substantial impact. The effect size for secondary education is small (PCC value), while for tertiary education it is medium-sized, indicating that the economic benefits of tertiary education are around twice those of secondary education.

Gong and Pan (2023) examined the returns arising from an additional year of advanced undergraduate education in Singapore, using a regression discontinuity design. They found that an additional year of college increases earnings by around 12 % six months after graduation, with persistent gains observed for at least four years. This study highlights the significant long-term benefits of extended higher education, and suggests that its benefits are not merely due to signalling but also to actual skill enhancement.

Dai, Cai and Zhu (2022) analysed returns on higher education in China following a substantial expansion in enrolment. Their findings indicate that each additional year of university education increases monthly earnings by 24 %. This demonstrates the value of higher education in a rapidly growing economy. The study also found that returns vary between different demographic groups, with urban students and those from more advantaged backgrounds experiencing higher returns than their rural and less advantaged counterparts.

Patrinos, Psacharopoulos and Tansel (2021) estimated private and social returns on investments in education in Turkey using the 2017 Household Labour Force Survey. They found a private rate of return of 16 % on higher education, and a social return of 10 %, with higher returns for females, public sector employees and those on a vocational track in secondary education. This study underlines the importance of continuing to invest in higher education in order to sustain economic growth and social development.

1.2 Economic contexts and returns on education

This section of the report delves into the evolving landscape of returns on education, exploring how various economic factors shape the value of educational qualifications over time. By examining recent shifts in transition economies and the effects of economic cycles, we gain insights into how returns on education have changed in response to rapid economic transformations and educational expansions. This section also investigates the impacts of education system structures and economic crises on these returns, highlighting complexities and disparities in the ways different regions and systems value educational investments.

1.2.1 Transition economies, economic growth and economic crises

Transition economies, particularly those in Central and Eastern Europe, provide a unique context for examining returns on education. Mysíková and Večerník (2019) examined differences between Western and Eastern Europe, noting that unlike Western European countries, transition countries in Central and Eastern Europe witnessed an upward trend in returns on education in the 1990s. Although returns on tertiary education have been converging across Europe since 2005, there remains a significant difference, with returns being considerably higher in the East. This difference can attributed to various factors, including the labour market's response to the dynamics of labour supply and demand. In Eastern Europe, rapid economic transformation created a high demand for skilled labour, leading to higher returns on education. In contrast, Western Europe experienced more gradual changes, resulting in more stable but lower returns. For another study that compares the transition economies with their Western European counterparts, see Perugini and Pompei (2011).

Another factor that significantly influences returns on education is the rate of economic growth. demand for highly skilled labour increases in rapidly growing economies, leading to higher returns on education. This is because economic growth often drives technological

advances and innovation, which require a skilled workforce. Skilled workers are better equipped to adapt to these changes, which makes their education more valuable. Conversely, in slower-growing economies, the demand for skilled labour is lower, leading to smaller returns on education. This suggests that the pace of economic growth can significantly influence the value of education and the opportunities available for skilled workers.

Hanushek et al. (2017) explored the relationship between returns on education and the rate of economic growth by analysing data from 32 countries. They found that returns on skills are greater in those countries where prior economic growth was faster. This suggests that skilled workers can adapt more readily to economic changes, resulting in higher returns on their education. The study's findings indicate that private returns on skills are particularly pronounced in rapidly growing economies such as Singapore and Chile. This highlights the importance of economic growth in enhancing the value of education and skills, as dynamic economies require a more skilled workforce to sustain growth and innovation.

Conversely, economic crises can have a significant negative impact on returns on education. Robert, Saar and Kazjulja (2020) explored the effects of the 2008 economic crisis on returns on education in eight EU countries. They found that the crisis had a more substantial negative impact on those who were less educated, with post-communist countries being harder hit. However, institutional variations at country level influenced the extent of these effects. High flexibility and low inequality provided some defence against the crisis, while corporatist features and employment protection reduced the effects of the crisis.

The 2008 economic crisis highlighted the vulnerability of less educated individuals in the labour market. The study by Robert, Saar and Kazjulja (2020) shows that countries with more flexible labour markets were better able to mitigate the negative effects of the crisis. This suggests that labour market policies and institutions play a crucial role in determining returns on education during economic downturns.

1.2.2 Structural and systemic factors

Barone and van de Werfhorst (2011) provide insights into why education is rewarded differently in different countries. Their analysis, using International Adult Literacy Survey (IALS) data, reveals that a significant portion of returns on education relate to individuals' cognitive skills. In countries that have vocationally oriented education systems, such as Germany and the Netherlands, work-specific skills explain a larger fraction of the returns on education. In contrast, in countries with more general education systems, such as the US and UK, measured literacy skills have a smaller effect on earnings. This suggests that the structure of the education system plays a crucial role in determining returns on education, with vocationally oriented systems providing more direct pathways to employment and higher returns.

Van de Werfhorst (2011) supports these findings, showing that vocationally oriented systems produce more work-relevant skills, while measured literacy skills exert a relatively smaller effect on earnings. This underlines the importance of an education system's orientation in determining returns on education. Countries with vocationally oriented systems may benefit from higher returns on education, due to the alignment between education and labour market needs. This suggests that educational policies should consider the structure and orientation of the education system in order to maximise returns on education.

Differences in returns on education between countries can also be attributed to the varying structures of their labour markets and economies. For instance, countries with more flexible labour markets, such as the US and the UK, tend to have higher returns on education because these markets reward skills and education more directly. In contrast, countries with more regulated labour markets, such as Germany and the Netherlands, may see lower returns on education due to their emphasis on vocational training and apprenticeships.

In recent decades, the phenomenon of "university rush" – sometimes also referred to as "(massive) educational expansion" – has emerged as a significant trend in various Western countries, driven by the pursuit of higher education by increasing numbers of people. This trend is, however, marked by a paradox whereby higher educational attainment does not necessarily equate to improved socio-economic status, leading to the phenomenon of "overeducation".

Research by Chauvel (2020) examines a troubling trend among the European middle classes, particularly in France, where higher educational attainment has not translated into improved socio-economic positions for younger generations. Despite receiving on average three more years of education than their parents, these young adults often find themselves in lower socio-economic positions. This phenomenon, known as qualification inflation, results in the diminishing value of intermediate-level qualifications. Essentially, as more people earn higher degrees, the market value of these degrees declines, making it harder for such individuals to achieve higher socio-economic status. This educational downgrading has led to a pessimistic outlook, particularly in continental and southern European countries, where the gap between socio-economic expectations and reality is most pronounced.

In addition, the crisis affecting non-selective universities further highlights this issue. Over the past 20 years, the average age at which students complete formal education in France has increased by two years, but the return on this educational investment is questionable, especially for graduates of less prestigious institutions. While prestigious universities continue to provide a pathway to elite positions, non-selective institutions face a radical devaluation of their qualifications. This situation creates a paradox: as the intrinsic value of higher degrees decreases, the perceived necessity to acquire them increases, mirroring the "educational disenchantment" in the US in the 1970s, when many sought higher degrees despite diminishing economic rewards, as degrees held less relative value in the labour market and no longer helped the candidate to "stand out" in the job market.

A study by Becker and Blossfeld (2022) delves into how increasing participation in education, economic modernisation and business cycles influenced returns on education in West Germany between 1945 and 2008. The authors' research reveals that societal changes over this period significantly impacted the value of educational qualifications for both women and men entering the labour market. Despite a general increase in education and rising skill demands, highly qualified graduates have seen an increase in the returns on their education. This suggests that in Germany, higher levels of education are increasingly rewarded in the labour market.

However, the study also highlights a troubling trend: men with lower levels of education have not experienced similar gains. This divergence has led to a growing polarisation in economic outcomes between those with tertiary education and those without. These findings highlight a persistent mismatch between the expansion of educational opportunities and the actual demands of the job market, with less-qualified individuals facing stagnating or declining returns on their educational investments.

Figueiredo et al. (2017) explored the impact on graduate employability of the rapid expansion of higher education in Portugal, with a particular focus on how well graduates' skills aligned with job market demands. Their study identified three significant challenges for graduates: overeducation, whereby individuals have more education than required for their jobs; overskilling, whereby individuals' skills exceed job requirements; and education–job mismatches, whereby graduates' qualifications do not fit the positions they secure. The authors' findings indicate that while there had been a combined increase in overeducation and overskilling, this had not been a widespread – and the dynamic nature of the job market's had helped to manage these issues to some extent. However, the study highlights a growing heterogeneity in the labour market, with increasing occupational diversity leading to variations in job requirements. This dynamism and diversity creates pockets in which overeducation coexists with underskilling, underlining the complex relationship between higher education and labour market outcomes.

The authors' research further reveals that the growing diversity in job roles and the expanding range of higher education institutions contribute to a complex picture in which robust overall trends in returns on education coexist with smaller pockets of independent outcomes. For instance, new graduate jobs require a broad set of market-related skills, including strategic, coordination, interactive and self-management skills. This shift reflects broader economic changes, such as technological and organisational advances, which influence how well educational qualifications translate into employment success. The study also emphasises that family background and regional labour market conditions significantly affect employment outcomes. Graduates from more privileged backgrounds, as well as those in regions with larger, more dynamic job markets, tend to have better prospects. In contrast, those from less advantaged backgrounds or in smaller or less vibrant regional markets face greater difficulties.

These findings suggest that while the expansion of higher education has created more opportunities, the benefits of these are unevenly distributed. The increased complexity and heterogeneity in job market demands highlight the need for ongoing research to understand how well the labour market adjusts to the influx of graduates, and whether the burden of adaptability falls disproportionately on new graduates. Thus, while higher education continues to expand, its effectiveness in improving employment outcomes is significantly dependent on structural factors and the ability of the labour market to accommodate diverse qualifications and skills.

Johnes, Johnes and López-Torres (2017) provide a comprehensive overview of returns on overeducation – highlighting that overeducated workers, while earning higher wages than their undereducated counterparts, still earn less than might be expected, given their level of education. This educational mismatch represents a cost to individuals and to the economy, reflecting the inefficient allocation of resources. The authors' study also explores gender differences in returns on overeducation, with mixed findings. In addition, it notes that the likelihood of individuals being overeducated varies by region, and is influenced by factors such as family background and the size of the regional labour market.

1.3 Micro- and demographic factors that influence returns on education

1.3.1 Field of study and returns on education

Shifting the focus to a series of factors that influence returns on education, we begin by considering the impact of an individual's disciplinary focus on the rates of private returns

on education. Belfield et al. (2018) examined the relative returns in the labour market on various types of degree in the UK, finding wide variation in earnings between graduates from different subjects. Degrees in medicine, maths and economics typically yielded higher returns, while creative arts degrees resulted in lower earnings. These differences persisted even after accounting for student characteristics, indicating that the choice of field of study significantly impacts financial outcomes. For instance, graduates in medicine can expect earnings that are 30 % higher than the average graduate, while creative arts graduates earn about 25 % less than the average.

McRae (2019) analysed financial returns on education across different fields of study in Canada. Using Mincer regression equations, the study found that business majors had the highest average expected return to education, while engineering majors had the lowest. The study also explored the interaction between gender and years of schooling, finding no significant impact on expected financial returns for business majors, indicating that returns are relatively consistent across genders within this field.

Katrňák and Doseděl (2019) examined the relationship between education and occupation across 30 European countries. Their study found that the role played by fields of study has changed, with natural sciences, computer science, and IT fields gaining strength in terms of returns. This shift aligns with the theory of task-biased technological change, whereby the importance of tasks rather than skills determines the occupational rate of return on education. The study highlights the increasing value of technical and scientific education in the labour market.

Beblavy, Lehouelleur and Maselli (2013) compared the then-current net value of higher education across five European countries. They found that STEM (science, technology, engineering and mathematics) fields often do not offer the best financial returns, particularly for female students. The study suggested that students' decisions were consistent with their private returns, and that policymakers should consider changing incentives to influence behaviour. The findings indicated that where STEM fields have high initial costs in terms of opportunity costs, the financial returns post-graduation for women might not fully compensate. As with other findings from the early 2010s, these might not fully apply to the changing labour market in the 2020s.

The study by Johnes, Johnes and López-Torres (2017) provided insights into returns on education in the UK, by subject. The authors found that law, business and economics offered higher returns compared with other subjects. The study also noted that the class of degree earned (traditionally referred to as the "grade") has a differential effect on subsequent earnings across subject areas, with higher-class degrees yielding higher returns. This underlines the importance not only of the field of study, but also the level of achievement within that field, in determining economic outcomes.

Böckerman, Haapanen and Jepsen (2019) investigated labour-market returns on higher vocational schooling in Finland. They found that attendance in vocational Master's programmes led to an earnings increase of more than 7 % five years after entry. The estimated effect remained positive even if selection on unobservables is twice as strong as selection on observables. Gains in earnings were similar by gender and age, but they were marginally higher for those in the health sector than for those in the business or technology and trades sectors.

Strawiński, Majchrowska and Broniatowska (2018) analysed changes in wage premiums corresponding to different levels of education in Poland between 1995 and 2013. This study focused on vocational education, and found that a decline in the number of vocational school graduates had led to a shortage of skilled labour in some labour market segments, resulting in an increased relative wage premium for young employees with vocational skills.

Concurrently, the rapid rise in the number of graduates of tertiary education had created a crowding effect, lowering the wage premium for this group. This finding was further developed for 26 OECD countries by Araki (2020), who disaggregated the premium between credentials and skills. He found that the premium for credentials far outweighs that for skills, but returns on credentials decline in tandem with increasing diffusion in the society, whereas skills retain their premium even as they diffuse in a given society.

Leppik (2017) examined the labour market success of vocational and higher education graduates in Estonia. This study found that graduates from higher education earned more than those from vocational education. Employment rates were higher among higher education graduates, and income for graduates of all levels of education had increased in comparison to previous years. The study also highlighted that the attainment of higher educational led to greater success in the labour market.

1.3.2 Gender differences in returns on education

Looking at the impact that gender has on returns on education, Andersen et al. (2020) explored cross-programme differences in gender earnings gaps in Denmark. They found that gender earnings gaps differed significantly between university programmes. This effect was noted to become more pronounced over time and is not explained by marriage or childbirth. The study highlights the need to address gender disparities associated with specific educational programmes. For instance, if a particular programme is found to lead to consistently larger gender earnings gaps, it is essential for educational institutions and policymakers to investigate the underlying factors that contribute to these disparities. This might involve examining aspects such as the curriculum, industry connections, job placement opportunities, or the support provided to female students and graduates within that programme. In addition, the study highlights that the earnings gaps observed tended to widen over time, suggesting that early career interventions alone may not be sufficient. Continuous support and adjustments may be necessary throughout the career trajectory of graduates to address these long-term disparities. Importantly, since the study found that factors such as marriage or childbirth did not explain the gender earnings gaps, it implies that these disparities are rooted in the educational and professional environments related to specific programmes, rather than in personal life choices.

Menon et al. (2017) investigated influences on the intention to enter higher education, with an emphasis on expected returns. The study found that gender and ability are significant individual variables in determining demand for higher education. Higher-ability students are more likely to enter higher education, and female students tend to have higher educational aspirations. These findings reflect the importance of stimulating academic performance in order to increase private demand for tertiary education.

Delaney (2019) has investigated the impact of risk on returns on education, discovering significant differences based on gender. The study found that for males, risk leads to larger returns from both high school and college education, whereas for females, risk increases returns on high school education, but reduces returns on college education. This disparity underlines the importance of incorporating risk adjustments into analyses of educational returns. Without accounting for risk and the selection processes for employment, estimates of the returns on education can be biased and misleading. This finding is crucial, as it reveals that evaluations of educational value need to consider risk factors in order to provide a more accurate picture of the benefits associated with different levels of education for different genders.

These findings should be understood in the context of overall developments in Europe, where in European Union countries – unlike non-member countries in Eastern Europe and the Middle East and North Africa (MENA) – women generally show higher rates of university

enrolment, higher graduation rates and lower rates of NEET (not in education, employment or training) in comparison to men.

1.3.3 Class and socio-economic status

Another factor that impacts rates of return on education is an individual's socio-economic status, although this impact manifests in diverse ways across different contexts.

Menon et al. (2017) discussed the influence of social class on the decision to pursue higher education in Cyprus. They found that social class remains a significant determinant of the choice between higher education and employment after finishing high school, especially in the context of economic downturns. This suggests that economic conditions can exacerbate educational inequalities, making it important for policies to address the barriers faced by disadvantaged groups.

Huang, Xu and Zhu (2019) investigated the effects of China's dramatic (almost fivefold) increase in annual higher education enrolment during the decade that began in 1999. The authors focused on how this expansion impacted earnings and educational attainment across different socio-economic groups. They found that the increase in higher education enrolment exacerbated the pre-existing educational attainment gap between urban and rural students, largely due to the *hukou* (household registration) system. This system created barriers for rural students, limiting their access to higher education and thus widening the gap between those with urban *hukou*, who benefitted from the expansion, and those who did not.

The study used a difference-in-differences approach, comparing rural students (who were less affected by the expansion) against urban students (who were more likely to benefit from it). This method revealed that the expansion had increased the earnings of graduate men by 17 % and graduate women by 12 %. Increases were particularly notable among those urban *hukou* holders who would not otherwise have enrolled in higher education. In addition, for students from disadvantaged backgrounds, returns on education were found to be at least as high as those for more advantaged peers, suggesting that the expansion had provided significant benefits even to those from less privileged families. However, the overall effect of the expansion was to deepen the disparity between urban and rural students, underlining the need for policies to address these structural inequalities and ensure more equitable access to higher education.

Peng, Yip and Law (2019) examined intergenerational earnings mobility and returns on education in Hong Kong, finding that educational opportunities significantly influenced economic mobility. Despite a substantial expansion in tertiary education, intergenerational economic transmission remained strong among high earners. This suggests that while education can improve mobility for some, systemic inequalities persist, necessitating broader policy interventions.

1.3.4 Ethnicity and migration

Guetto (2018) analysed employment returns on tertiary education among immigrants in Western Europe. The study found that in Continental Europe, immigrants benefitted more from tertiary education than natives, with higher returns. In contrast, in Southern Europe, natives experienced higher returns than immigrants. This pattern held for both men and women, indicating that cross-country differences in labour market integration have an impact on educational returns for immigrants.

Building on this understanding, Debowy, Epstein and Weiss (2021) examined returns on education and the labour market experience in Israel, focusing on disparities in employment rates and wages among different ethnic groups. Their study highlights how education can narrow these gaps, showing that when education levels are similar, Jews from different population groups resembled their peers in terms of employment and wage levels. This finding indicates that the wage and employment disparities between these groups stemmed primarily from differences in educational attainment. The study did, however, point out that non-Jewish men – particularly Arabs – received only moderate returns on education. For these individuals, wage gaps in comparison with Jewish peersremained substantial even when they were better educated, with the exception of those holding doctoral degrees. This phenomenon can be partly attributed to the economic separation between Israel's Arab and Jewish populations, which hinders non-Jewish workers from realising the full potential of their education and experience. Additional factors, such as cultural and linguistic barriers, also contribute to these disparities. These findings suggest that for many Israelis, particularly from disadvantaged backgrounds, formal higher education is crucial to securing employment and optimising their skills in the labour market.

Policies aimed at increasing access to higher education, particularly for underrepresented groups, can therefore produce significant economic benefits. Such policies might include expanding educational institutions in geographic peripheries, enhancing online learning opportunities, and addressing cultural and linguistic barriers to education. Both of the studies above underline the critical role higher education plays in improving labour market outcomes – in the former case for immigrants; in the latter case, for ethnic minorities. They highlight the need for tailored educational policies that address the unique barriers faced by these groups, ensuring that they can benefit fully from investments in education. By so implementing such policies, countries can improve the utilisation of human capital and foster more inclusive economic growth.

1.3.5 Vocational education

This section of the report examines returns on vocational education in comparison with general education, drawing on various studies across different countries. Here, vocational education – which is designed to equip students with specific skills for particular trades or professions – significantly influences individual earning potential and labour market outcomes. The papers cited look at vocational higher education or vocational education in general, although there is less emphasis on changes in returns in recent times, due to the unavailability of literature.

Böckerman, Haapanen and Jepsen (2019) explored labour-market returns on vocational Master's degrees in Finland. Using individual fixed-effects models on a matched sample of students and non-students, the study found that attending a vocational Master's programme led to an earnings increase of more than 7 % five years after entry. This positive effect remained significant even where selection on unobservables was twice as strong as selection on observables. These increases in earnings were consistent across genders and ages, with slightly higher returns observed in the health sector compared with business or technology and trades sectors. These findings highlight the economic value of vocational education at Master's level, emphasising its role in enhancing earning potential and providing substantial long-term economic benefits (Böckerman, Haapanen, and Jepsen, 2019).

Strawiński, Majchrowska and Broniatowska (2018) analysed the wage premiums associated with different levels of education in Poland from 1995 to 2013, focusing on vocational education. The study noted that vocational training is often associated with disadvantaged individuals who may find it challenging to participate in general education.

The 1999 educational reform in Poland, which aimed to reduce educational inequalities, inadvertently led to a decline in vocational school enrolments, resulting in a shortage of skilled labour in certain sectors. This shortage increased the relative wage premium for young employees with vocational skills. The findings indicate that vocational qualifications are crucial in the labour market, and suggest the need to improve the quality of vocational training at both secondary and tertiary levels to attract more students and meet market demands (Strawiński, Majchrowska and Broniatowska, 2018).

Leppik (2017) investigated the labour market success of vocational and higher education graduates in Estonia. Her analysis showed that rates of employment among vocational education graduates were high, and salaries were competitive. Employment and income data from 2017 revealed that vocational education graduates enjoyed an employment rate of 74 %, compared with 80 % for higher education graduates. In addition, salaries for vocational education graduates were higher than the national average, indicating the financial viability of vocational paths. Vocational programmes in fields such as ICT, security services and technology yielded the highest graduate salaries, underlining the importance of vocational education in ensuring labour market success (Leppik, 2017).

Hanushek et al. (2011) demonstrated that in countries with well-developed vocational education systems, such as Germany, Denmark and Switzerland, vocationally educated workers enjoy an initial wage advantage. This advantage may, however, decrease over time as individuals with generally education catch up in terms of earnings. This trend is particularly evident in the context of apprenticeship programmes that emphasise practical, hands-on training (Hanushek et al., 2011). Van der Velden et al. (2023) further elaborate on this issue by showing that these workers also require general skills, which strongly affect the wages of vocationally educated workers and are just as important a factor in wage determination as they are for generally educated workers.

Research into returns on education in transition economies, such as those in Central and Eastern Europe, indicates that vocational education can lead to higher returns compared with general education. Andersson et al. (2013) found that vocational education in these regions provided a significant wage premium, reflecting the high demand for vocational skills in rapidly changing labour markets. This finding aligns with the observation that vocational education graduates often transition to work more quickly and secure permanent jobs more readily than their peers with general education (Andersson et al., 2013).

Conversely, in a piece that analysed the effects of vocational training on the length of an individual's unemployment in Eastern Germany, Hujer et al. (2006) showed that the impact of such education was "significantly negative," as explained through the hypothesis that "the programmes offered were not compatible with market demand." More broadly, however, a report by Cedefop (2013) emphasised that vocational education graduates generally experienced a faster transition to work, were more likely to have permanent first jobs, and faced fewer qualification mismatches. This was particularly true in sectors such as ICT, health and technology, where vocational training aligns closely with labour market needs. The report suggests that vocational education is effective in preparing students for the labour market, ensuring they have the skills required for success in their chosen fields (Cedefop, 2013).

1.3.6 Influence of institutional and sectoral factors on returns on education

Institutional characteristics have a significant influence on returns on education, as demonstrated by studies conducted in both the United States and the United Kingdom.

Coelho and Liu (2017) analysed data from over 500 colleges in the US, finding that variables such as acceptance rates and faculty salaries played a crucial role in determining post-graduation incomes. Their study indicates that graduates from private schools tended to earn modestly higher salaries than those from public schools. This suggests that institutional prestige and the resources available to private schools contribute to better economic outcomes for their graduates. The analysis implies that the benefits of private schooling may extend beyond direct financial returns, potentially encompassing broader career advantages.

Similarly, Belfield et al. (2018) highlighted the importance of institutional factors in the UK. Their research revealed significant variations in earnings among graduates from different universities. Specifically, graduates from high-status universities, such as those in the Russell Group, generally enjoyed higher earnings compared with graduates from other institutions. These differences remained substantial even after accounting for student characteristics, indicating that the quality and reputation of the university attended are critical determinants of economic success. This evidence underlines the role of institutional quality and the signalling effect of attending prestigious universities in shaping returns on education.

Returns on education also vary significantly between the private and public sectors of employment. De Meulemeester and Rochat (2017) examined this dynamic in Belgium, finding that the returns on education are higher in the public sector compared with the private sector. This disparity highlights the influence of sectoral differences on the economic benefits of education. The study suggests that screening and signalling processes may be more pronounced in the public sector, where educational qualifications are crucial in hiring decisions. The higher returns seen in the public sector imply that educational attainment might play a more significant role in career advancement and salary progression within this sector.

The findings from these studies collectively emphasise the critical role played by institutional characteristics and sectoral contexts in determining returns on education. The prestige and resources of educational institutions, along with the specific sector in which graduates are subsequently employed, significantly shape the economic outcomes of those graduates. Understanding these factors is essential for policymakers and students alike, as they navigate educational and professional landscapes to maximise returns on educational investments.

1.4 Social returns on education vs the "brain drain"

1.4.1 Social returns more broadly

While the focus of this paper is on private returns on education, it is essential to also acknowledge the broader societal returns of education. In their general overview of social returns, Johnes, Johnes and López-Torres (2017) emphasise that education provides numerous social benefits, including improved political systems, innovation infrastructure, health outcomes, social trust, volunteering and civil order. These benefits accrue even if the private returns on education are exhausted, highlighting the importance of education from a societal perspective.

Groot and de Groot (2020) provide further evidence on the societal returns of education using matched worker–firm micro-data from the Netherlands. Their study shows substantial heterogeneity in the relationship between agglomeration and the productivity

of workers with different educational backgrounds; in other words, they aim to estimate "whether the composition of the local labour market in terms of education is related to the productivity of different types of workers" (p.53). The authors find that agglomeration externalities, i.e. the broader economic benefits of clustering, are substantially higher for high- and medium-skilled employees than for low-skilled employees. According to the authors, "highly educated individuals are generally more specialized, are in the possession of more knowledge, and are more likely to perform tasks that are related to processing knowledge, information, and innovation." (ibid, p. 2) However, they find no positive effects from the presence of high-skilled workers on the productivity of low-skilled workers.

The presence of universities is associated with a significant boost in the productivity and wages of high-skilled workers, suggesting an additional social return on education. While the paper does not explore the causal chain underlying this relationship, we can hypothesise that the presence of research and innovation-intensive institutions further enhances the agglomeration effects of human capital.

However, Psacharopoulos and Patrinos (2018), show a pattern of declining social returns on education, both by the country's level of economic development and the individual's level of education concerned. These social returns are universally lower than private returns, due to the public subsidisation of education and the higher costs associated with higher levels of schooling. Yet, recent research suggests that traditional estimates of social returns underestimate their true value because such studies do not account for externalities. Munich and Psacharopoulos (2017) highlight that including externalities, such as reduced mortality, indicates that the rate of social return on education could be up to 50 % higher than previously thought. Pradhan et al. (2018) found that monetising the value of reduced mortality shows that the social return on investing in one extra year of schooling in low-income countries could be as high as 16 %, compared with 11 % when considering only earnings differentials. This highlights the broader benefits of education beyond individual earnings, emphasising its critical role in societal development.

With regard to civic engagement, Gesthuizen and Scheepers (2012) and Hoskins et al. (2008) argue that educational systems instil civic competences and a sense of civic duty in children, influencing their future social and political participation. Huang et al. (2012) highlighted the causal effects of education on trust and membership of voluntary groups. The impact of education on political participation has been studied more extensively, although findings vary. Sondheimer and Green (2010) and Mayer (2011) identified positive causal effects of education on voter turnout in the US, whereas Kam and Palmer (2008) and Berinsky and Lenz (2011) did not. Meyer (2017) found that in European countries, an additional year of education shifts individuals' political ideology to the right by about 5-6 percentage points, indicating the nuanced impact of education on civic attitudes and behaviours.

Therefore, papers on social returns underline the variability of social returns across different economic contexts and levels of education, with substantial benefits in low-income countries due to human capital scarcity. It also emphasises the importance of accounting for externalities such as reduced mortality in order to fully appreciate the value of education.

1.4.2 Brain drain

The discussion on returns on education, both private and social, is closely linked to the phenomenon of brain drain, which refers to the migration of highly skilled individuals away from their home countries. Research indicates that graduates from higher education who emigrate tend to achieve higher returns on their educational investment. Valbuena and Zhu (2018) discovered significant returns among graduates who earned higher degrees in

the UK and then migrated there, especially for those from non-English speaking and low HDI/GDP countries. Poot (2013) supports this by noting that post-settlement education in the host country yields higher returns for migrants than for natives. Lupdag-padama (2014) also emphasises the high returns for certain undergraduate programmes, which can encourage professionals to work abroad. Collectively, these studies indicate that graduates who emigrate can indeed attain higher returns on their education.

With regard to social returns on higher education, it is crucial to consider a country's ability to retain these benefits in the face of migration. Research shows that educating migrants within the EU can bring substantial economic benefits, such as increased economic output, labour market participation and positive effects on government budgets (Bonin, 2017). However, individual economic returns on education do not differ significantly between migrants and non-migrants in European labour markets (Rodríguez-Pose, 2010). Furthermore, raising the average education level of the workforce can significantly boost labour productivity and economic growth (Canton, 2007). Therefore, while the education of migrants can have positive economic impacts, these benefits may not be fully realised by individual Member States. Brain drain and its unequal effects on different Member States thus becomes an important phenomenon to consider, given the accordingly unequal social returns on education that flow from it.

Chapter 2: Survey of key literature on the elasticity of demand for higher education

If there is an interest in understanding returns on education, the other side of the same coin would entail looking at what is happening in higher education from the perspective of demand. This can be achieved through a consideration of demand elasticities in higher education, as well as the impact of the rising interest in non-degree credentials. Thus, this chapter of the report examines how tuition costs affect enrolment rates, influencing private returns on education. It explores the rise of non-degree credentials such as micro-credentials and digital badges, highlighting their potential to enhance employability and address skills mismatches. The discussion also addresses challenges to the implementation of these credentials, such as institutional readiness and technological infrastructure.

2.1 Elasticity of demand in higher education

2.1.1 Economic factors

Understanding the elasticity of demand in higher education is crucial for policymakers and institutions aiming to balance tuition costs and enrolment rates. Menzies (2017) examined how varying tuition rates across different colleges within a public university in the US impacted enrolment and revenue. With increasing enrolment and decreasing state funding, differential tuition – that is, charging different rates for different programmes – has become a strategy to address financial gaps. Menzies calculated own-price elasticities (OPE) for eight colleges, including fields such as engineering and business, to assess how sensitive student demand is to changes in the cost of tuition.

The study found that demand elasticity varied significantly by discipline. Engineering programmes, for instance, had a positive OPE, suggesting demand might grow faster than supply if the cost of tuition were adjusted. Some colleges exhibited elastic demand (OPE>1), meaning that reducing tuition could increase both enrolment and revenue, while others were inelastic (OPE<1), where higher tuition might reduce enrolment but increase revenue. Implementing differential tuition based on these elasticities could generate an additional USD 4 million in revenue from first-year students. Menzies recommended using a portion of this revenue for needs-based financial aid to support low-income and minority students and reduce their risk of high student debt.

Other studies (also with a focus on the United States), such as those by Campbell and Siegel (1967) and Gallet (2007), have shown national OPE ranging from -0.44 to -0.60, indicating that increases in tuition costs generally lead to decreases in enrolment. Shin and Milton (2007) emphasise the importance of differentiating elasticities by subject major, as fields with higher expected returns tend to exhibit lower elasticities, meaning that students in these fields are less sensitive to increases in tuition costs.

Of greater relevance t to the European geographic context, Menon et al. (2017) conducted a study in Cyprus, which examined the impact of expected returns on the intention to enter higher education. This investigation indicated that the anticipated rate of return is a critical factor in individuals' decisions to pursue higher education, regardless of economic conditions. Although the perceived rate of return decreased between 2004 and 2013, it remained significant. The research also suggests that during economic recessions, social

class becomes a more important factor in decisions to pursue higher education . Despite economic challenges, countries with a strong cultural emphasis on higher education may maintain high participation rates in tertiary education. However, the few individuals who choose not to participate are likely to come predominantly from low socio-economic backgrounds. Nevertheless, this paper highlights the importance of perceived financial benefits in the decision-making process for higher education, reinforcing the human capital theory, which posits that education is an investment in future earnings.

2.1.2 Non-economic factors

The non-economic factors that influence individuals' choice of academic path have been examined through a wide range of lenses by a multitude of studies published since 2015. Beginning with the more established lines of inquiry, from the perspective of self-perceptions, Guo et al. (2015) wrote about US students' self-concept and their choice of academic paths. Liu (2020) explored the role of social capital (as conceptualised by Bourdieu and Coleman) in providing access to postgraduate education at a university in the south of China, demonstrating the different forms of social capital (and the related concept of *guanxi*, as a culturally situated notion of cultural capital, or a relationship that might turn into beneficial social capital in the future) utilised by students from different socio-economic backgrounds in making decisions about postgraduate education.

Likewise, with the aim of enquiring more deeply into gender-based inequalities in STEM fields, Wang and Degol (2017) reviewed papers published over the preceding 30 years in fields ranging from psychology, sociology and economics to education. They identified six explanations as to why women might be underrepresented in STEM fields that are maths intensive. Two of these focus on cognitive ability (absolute and relative); two look at interests and preferences; and two look at the effect of beliefs and biases related to gender. Their findings suggest that to reduce the gender gap in STEM, policymakers ought to pay attention to "the contributory cognitive, motivational, and sociocultural factors, primarily by maximizing the number of career options that women perceive as attainable and compatible with their abilities, preferences, and goals." Such career options, they argue, are ones that stress "female cognitive strengths, emphasizing hard work and effort instead of talent, cultivating female interest in math and science, and removing masculine stereotypes, misinformation, and obstacles that cloud career decisions."

Fewer answers can be found in the academic literature when it comes to explaining how mega-trends such as the rise of artificial intelligence (AI), or the threats posed by climate change, shape demand for particular academic pathways. Even grey literature only subtly touches on this topic. For instance, a report on "The Top 5 Global Megatrends in Higher Education" mentions the need for educational curricula and the marketing of courses to consider the challenges posed by the spread of AI and automation, as well as the climate crisis; however, only does so only in the form of predictions and policy recommendations. These include highlighting that "materials should make clear that course offerings will equip students with the skills they need to prosper in the 2020s and beyond", as job security is something students value and about which they are anxious, as shown by the rise in the use of university career services seen even before the pandemic (HEPI, 2020).

A notable intervention in this area (which goes beyond only considering a single area of studies) is that of Skatova and Ferguson (2014), who explored differences in individuals' motivations to pursue different undergraduate degrees. The authors identified four reasons why individuals choose university degrees: career concerns, intrinsic interest in the subject, an opportunity to help others, and because they are looking for an easy option to get into higher education. They investigated whether these motivations applied within two samples: (1) undergraduates (N=989) and (2) prospective students (N=896). The authors reached the following conclusions: "medical degrees were chosen due to a mixture of

Helping and Career, while engineering degrees were associated with Career and low Interest in the degree." Likewise, arts and humanities degrees were chosen "by Interest and low concern about future career, accompanied with high Loafing." They also reported on gender differences: "females were high in Helping (both samples) and Interest (only in the undergraduate sample) motivation, while males scored higher in Career (only in the undergraduate sample) and Loafing (both samples)."

2.2 Non-degree credentials: an emerging trend

The landscape of higher education is evolving rapidly with the introduction of non-degree credentials (NDCs) such as micro-credentials and digital badges (DBs). Ahsan et al. (2023) provide a comprehensive overview of the implementation and potential of micro-credentials (MCs) in higher education. Defined as competency-based learning models, MCs are awarded upon completion through digital badges, offering a visual representation of the skills acquired (Alamri et al., 2021; Oliver, 2019). These credentials can complement traditional degrees or stand on their own as proof of the mastery of a specific skill, aligning with formal qualification levels such as Bachelor's or Master's degrees (Oliver, 2019).

The global market for online degrees that incorporate MCs is expanding rapidly. HolonIQ (2021a, 2021b) projects significant growth, with online degrees expected to reach USD 74 billion in revenue by 2025, driven in part by the increasing importance of MCs for upskilling and reskilling in the labour market. This trend is already visible in both higher education institutions and global companies, which are adopting MCs as a means of maintaining a competitive edge in rapidly changing job markets (Brown et al., 2021; Wheelahan & Moodie, 2021).

Despite this enthusiasm, challenges remain in the adoption of MCs. Hartnett (2021) and Miller et al. (2020) have pointed out that higher education institutions are not yet fully ready to integrate MCs into their curricula. Such integration includes the need for robust instructional support systems and the alignment of MCs with existing learning management systems to ensure authenticity and proper tracking (Wilson et al., 2016). Technological readiness, including user-friendly platforms and secure administrative management, is crucial to the successful implementation of MCs (Behney, 2019; Coleman, 2018).

Gauthier (2020) underlines the growing recognition of competency-based hiring, with employers increasingly valuing the specific skills demonstrated through micro-credentials over traditional college transcripts. This shift is partly driven by the need for clearer articulations of an applicant's abilities in a rapidly changing job market. Employers in Gauthier's study expressed a preference for micro-credentials as they provide a more precise measure of an individual's competencies, suggesting that a registry for tracking and reporting micro-credentials would enhance their validity and acceptance.

The *Future of Jobs Report* by the World Economic Forum (Di Battista, et al., 2023) indicates that while traditional work experience remains the top criterion for skills assessment, there is significant potential for micro-credentials to open up new talent pipelines. Countries such as Pakistan and Finland are already leading in considering these credentials in hiring processes, demonstrating the potential for broader adoption globally.

Ehlinger and Stephany (2023) highlight the rise of skills-based hiring for emerging professions such as AI and sustainability (green) jobs. Their analysis of job vacancies in the United Kingdom from 2019 to 2022 indicates that employers are increasingly prioritising specific skills over formal qualifications for these roles. The demand for AI skills in particular has resulted in a significant wage premium, comparable with holding a PhD. This trend suggests that micro-credentials and other non-degree certifications could play a crucial role in addressing talent shortages in these high-demand fields.

Despite the growing acceptance and potential of non-degree credentials, several challenges need to be addressed. Students' perceptions of digital badges can be mixed, with some viewing them as less prestigious compared with traditional qualifications (Dyjur & Lindstrom, 2017; Zhou et al., 2019). In addition, higher education institutions must overcome logistical and administrative hurdles to integrate these new forms of credentialling effectively into their programmes (Reid & Paster, 2016; Wilson et al., 2016).

Technological readiness is another critical factor. As Behney (2019) notes, the success of MCs depends heavily on the technological infrastructure supporting them. This includes ensuring that platforms are user-friendly and that badges can be managed and authenticated securely (Coleman, 2018; Newby & Cheng, 2020). Partnerships between higher education institutions and industry stakeholders are also essential to establish the credibility and acceptance of MCs in the job market (Eager & Cook, 2020; Perkins & Pryor, 2021).

It can be concluded that the future of non-degree credentials in higher education looks promising, especially as more institutions and employers recognise their value. The research gaps identified by Ahsan et al. (2023) point to the need for further studies on the impact of MCs on learning outcomes, student motivation and employment opportunities, as detailed in the conclusions of this report.

Chapter 3: Findings and conclusions

This chapter of the report summarises the key findings of the review conducted above, drawing policy implications where appropriate.

Evidence continues to indicate that the global average private return on education is consistently high, at approximately 10 %. As the synthesis below makes clear, this return varies significantly across different axes, including (but not limited to) an individual's region, the economic performance of their country, their field of study and their gender, as well as depending on the characteristics of the institution from which they obtained their degree. All of the above factors also interact with one another to influence returns.

There is substantial evidence indicating that returns vary by region, with returns in developing countries being higher for primary education, and in developed countries for tertiary education. Economic volatility and rapid changes often necessitate greater skill adaptation, leading to higher returns in regions undergoing such conditions.

During times of economic crisis, returns on education tend to increase – although they may decrease slightly during periods of recovery. Urban areas and certain demographic groups, such as women and upper-income earners, often experience higher returns. Less educated individuals are generally more negatively affected by economic downturns, though flexible labour markets and low levels of inequality can mitigate some impacts.

There is a strong correlation between rapid economic growth and higher returns on education, due to increased demand for skilled labour. Conversely, economic crises typically result in reduced returns for less educated individuals, although flexible labour markets and policies that promote equality can help to buffer these effects. Vocationally oriented education systems tend to yield higher returns, due to their better alignment with labour market needs. Increasing participation in education can lead to the phenomenon of overeducation and the subsequent devaluation of qualifications.

Returns on education vary significantly between different fields of study, with degrees in medicine, maths and economics yielding higher returns compared with creative arts and other fields. The increasing value of a technical and scientific education is well documented, although estimates usually ignore the higher opportunity and other input costs.

Gender disparities in educational returns are evident, with women often experiencing lower returns in certain fields but higher returns in others, despite higher enrolment and graduation rates in EU countries. Career trajectories, occupational sorting and societal norms contribute to these variations. Socio-economic background significantly influences returns on education. While higher education can enhance economic mobility for disadvantaged groups, persistent inequalities remain, necessitating targeted policies to ensure equitable access to educational opportunities. Returns on education for immigrants and ethnic minorities vary significantly between regions. In some countries, immigrants may achieve higher returns than natives, while in others, they face substantial wage gaps despite similar levels of educational attainment. Cultural and linguistic barriers often exacerbate these disparities.

Institutional characteristics, such as the prestige and resources of certain educational institutions, significantly affect returns on education. Graduates from prestigious universities typically enjoy higher earnings. Returns on education also vary between the

public and private sectors, with higher returns often being observed in the public sector due to its greater emphasis on educational qualifications. Vocational education provides substantial economic benefits, often leading to faster employment and higher initial wages in comparison to general education. However, the long-term wage advantage of vocational education may decrease over time as the earnings of general education graduates catch up.

The above findings point to the importance of the structure of the labour market and its interaction with growing participation in higher education. Countries with identical education policies may thus face different outcomes in terms of returns and their dynamics if labour market flexibility is different. Even when the average result of these policies is similar, their impacts on different groups may differ.

Furthermore, the findings indicate that with participation in higher education increasing and a higher percentage of tertiary-educated people in the labour market, these factors are likely to grow and strengthen. From a policy perspective, it is therefore increasingly less relevant to treat graduates as a homogeneous group. Policies that affect graduates – whether dealing with the (opportunity) costs of higher education or strategic planning – need to be attuned to this heterogeneity.

In terms of broader social returns, education yields numerous social benefits, including improvements in political systems, innovation, health outcomes and social trust. These social returns are generally higher in lower-income countries, due to the scarcity of human capital. However, traditional estimates often underestimate social returns as they do not fully account for externalities such as reduced mortality.

The migration of highly skilled individuals, known as "brain drain", poses challenges to retaining social returns on education. Graduates who emigrate often achieve higher returns abroad on their educational investment. While educating migrants can benefit host countries economically, individual Member States may not fully realise these gains. At European level, this raises an interesting issue whereby these externalities are internalised, given that most migration from EU countries is to another EU country, but some Member States might bear heavy costs from such outcomes. Since free movement of individuals is one of the linchpins of the European project, it is hard to imagine policies to counter this migration. However, there is a possibility that European policies could compensate for these losses or could invest in the development of competitive higher education institutions in source countries, as is already happening through Structural Funds and the Recovery and Resilience Facility.

Meanwhile, elasticity of demand is a crucial issue in balancing tuition costs and enrolment rates. Studies have shown significant variability in demand elasticities across different disciplines. Fields with high expected returns, such as engineering, tend to have inelastic demand, meaning students are less sensitive to increases in tuition costs. In addition, anticipated financial returns play a significant role in an individual's decision to pursue higher education. Even during economic recessions, participation rates in higher education remain high in countries with a strong cultural emphasis on education, although those with low socio-economic backgrounds are less likely to participate. This highlights the importance of perceived financial benefits and the need to support low-income students.

Non-economic factors also have a significant influence on the choice of academic paths. Self-perception, social capital and societal norms all play crucial roles in these decisions. For example, students' self-concept and social networks impact their access to and pursuit of higher education, with gender-related stereotypes and biases affecting participation in STEM fields. Students' motivations for choosing different degrees vary, and include career concerns, intrinsic interest in the subject area, the desire to help others, and the perceived

ease of obtaining a degree. Gender differences in motivations are also evident, with females being more driven by helping and intrinsic interest, while males are more influenced by career prospects and the perceived ease of the degree.

Mega-trends such as the rise of AI and climate change also shape demand for particular academic pathways, although this area is less explored in the academic literature.

The landscape of higher education is evolving with the introduction of non-degree credentials (NDCs) such as micro-credentials and digital badges. These competency-based learning models can complement traditional degrees or stand on their own as proof of the mastery of a specific skill. The global market for online degrees that incorporate micro-credentials is expanding rapidly, driven by the need for upskilling and reskilling in the labour market. Employers are increasingly valuing the specific skills demonstrated through micro-credentials over traditional college transcripts, recognising their potential to provide a clearer measure of an individual's competencies. However, students' perceptions of digital badges can be mixed, with some viewing them as less prestigious than traditional qualifications.

The future of non-degree credentials in higher education looks promising, especially as more institutions and employers recognise their value. Further research is needed on the impact of micro-credentials on learning outcomes, student motivation and employment opportunities. Advanced research methodologies, such as machine learning, could help in predicting the types of micro-credentials in demand and tailoring programmes to meet these needs.

Overcoming logistical and administrative hurdles will be crucial in order to effectively integrate these new forms of credentialing into higher education programmes. At European level, this topic has been the object of significant attention for some time– see in particular the Council of the European Union (2022) and Council of the European Union (2024). Unsurprisingly, though, much work remains to be done – particularly with regard to implementation.

In light of the above findings and ongoing discussions presented in this report, several key areas emerge in which further targeted research could significantly enhance understanding and inform policy development. First, the increasing prevalence of non-degree credentials, such as micro-credentials and digital badges, calls for focused research on their impact within higher education. Studies could specifically examine how these credentials affect employability, wages and long-term career trajectories in comparison to traditional degrees, as well as how they influence learners' motivation. A key policy implication here is the need for further study of those aspects which are highly policy-relevant but remain understudied – namely, how students make decisions between "traditional" higher education and these new forms – as so far, the focus has been almost exclusively on the supply side (from providers of education) and the demand side (from employers). Advanced research could also map labour market trends using machine learning to identify which micro-credentials align most effectively with skills demands, particularly in fast-evolving fields such as technology and green energy. Such research would provide empirical insights into the most market-relevant competencies, guiding institutions in designing their programmes strategically.

Regional and demographic variations in returns on education, highlighted throughout this report, underscore the critical need for further research that explores how these disparities manifest and persist. Given that returns differ significantly by gender, socio-economic background and geographical region (e.g. urban versus rural settings), future studies could focus on pinpointing the underlying mechanisms that contribute to these variations. Such research could support the development of tailored educational policies and funding

allocations aimed at improving equitable access and optimising the socio-economic returns on education for underrepresented and disadvantaged groups.

The influence of economic volatility on returns on education – observed through fluctuations in private and social returns during times of crisis – warrants specific examination. While returns on the acquisition of labour skills may increase during economic downturns, low-skilled individuals often experience a reduction in returns. This underlines the importance of understanding how labour markets and education outcomes intersect during different phases of the economic cycle. Future studies could analyse long-term data from recent economic crises, with a particular focus on measuring their impacts on vulnerable groups, as well as evaluating strategies to mitigate negative impacts on those with lower levels of educational attainment.

Vocational education continues to demonstrate positive returns, especially in terms of employability and early-career wage competitiveness, yet its alignment with the dynamic demands of the labour market remains variable. Research could delve into the factors that make vocational education successful in certain sectors or regions, investigating both immediate and long-term economic outcomes for vocational graduates across different industries. Comparative studies on vocational and general education in relation to technological shifts, skills needs and labour market outcomes would help to refine vocational pathways and inform broader education policy frameworks.

Lastly, the phenomena of overeducation and qualification inflation, which have emerged as structural issues within labour markets, demands comprehensive attention from researchers. As the labour market becomes saturated with graduates of tertiary education, the economic value of degrees is diminishing in certain sectors. This affects socio-economic mobility and individual career prospects. Future studies should focus on assessing how qualification inflation impacts wage levels, job satisfaction and occupational mobility, as well as examining policies that could better balance educational attainment with labour market demands. Such insights would aid in crafting more sustainable approaches to higher education that align more closely with workforce needs and maximise the returns for graduates.

Exploring these areas with greater specificity would provide a robust evidence base for policymakers and educational institutions, enabling more responsive and targeted strategies that adapt to shifting economic and social landscapes.

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