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Boosting Social and Economic Resilience in Europe by Investing in Education

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Boosting Social and Economic Resilience in Europe by Investing in Education*

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Foreword



Only time will reveal the full impact of the Covid-19 pandemic and its social and economic consequences.

But experts agree on one fundamental point already: the closing of schools and universities will generate significant learning losses for our pupils and students. This in turn will affect their future earnings and general wellbeing – and with it the European economy.

To fill these gaps in the years to come, we must start to put well-targeted countermeasures in place now.

This report is an attempt to quantify the implications of Covid-19 on education losses. It highlights the important benefits that investment in education can bring to the economy and society, not least in a moment of crisis, and proves that: **investing in the education sector will contribute to boosting social and economic resilience in Europe.**

This is why, in September 2020, I presented a comprehensive education package organised around two key initiatives: the creation of the European Education Area by 2025, and the Digital Education Action Plan, which will be instrumental to boosting digital skills.

The European Union has made larger resources available for education, under the Erasmus programme, the European Social Fund+, the European Regional and Development Fund, the Digital Europe programme and the InvestEU fund. In addition, the Recovery and Resilience Facility will enable specific and targeted funding for education in the EU Member States, to contribute to the recovery from the effects of the pandemic.

This means that the EU will channel more funds than ever before into education over the next seven years. And the European Commission will help national authorities to make the best use of the available funds through a newly established expert group on quality investment in education.

Our youth are the EU's future, and they deserve our undivided attention.

Every single pupil in the EU should be able to enjoy the benefits of high quality and inclusive education at all times.

Mariya Gabriel
Commissioner for Innovation, Research, Culture, Education and Youth

Results at a glance

This report focuses on the social and economic resilience that might be achieved by well-designed and well-targeted investment in education. It provides a review of the individual and social returns of education in terms of both economic and non-economic effects. The most important economic benefits for individuals include better skills, better employability, increased productivity and higher earnings. Among the non-economic benefits associated with education are better health, lower crime rates and higher levels of trust, tolerance, and civic and political engagement. At the societal level, the most relevant returns from education are associated with higher GDP growth, better diffusion and adoption of technologies, higher innovation capacity, stable public finances and better social cohesion.

We show that European countries, which are endowed with better education, both in terms of quantity and quality, recover faster from economic shocks and have better economic resilience. We also provide evidence that individuals who are more educated are more flexible and adaptable to new technological advances, and we discuss the specific skills that are expected to be most in demand in the future. We point out that access to high-quality preschool education for disadvantaged children is one of the most important policies to tackle existing inequalities within a society.

The report also discusses the implications of the Covid-19 related school lockdowns in early 2020 on individuals (students, teachers and parents), educational institutions and systems, and suggests that if not tackled adequately during the recovery stage, the immediate adverse consequences – such as interrupted learning and skills formation, exacerbated educational inequalities and rising dropout rates – could lead to high social and economic costs in the long term.

Executive summary

Education fosters economic growth and social cohesion. It plays a critical role in individual and societal prosperity, and is essential for personal development and welfare. Investment in education provides substantial long-term gains for individuals, public finances and the knowledge-based economy as a whole. Looking at all the different policies in the past half-century, investment in education, along with health policy, is associated with the highest rate of return. According to different micro and macro estimates, the rate of return on investing in human capital is significant, especially when compared to alternative investment opportunities.

Overall, education boosts labour productivity and gives impetus to the innovation required to move the economy. It increases the potential for retraining and career development, as well as opportunities for the workforce to adapt to changes in the workplace as a result of technological developments and/or changes in the essential characteristics of the professions. Since there is a strong relationship between education and earnings, higher levels of education also benefit public finances.

The expected benefits of education go beyond earnings and employment, by affecting, for instance, health and longevity, happiness and pro-environmental behaviour. There is a positive correlation between education and health in European countries. More and better education can also reduce criminal activities by increasing future legitimate work opportunities, which discourages participation in crime, and by influencing the set of people individuals interact with on a daily basis in school, work or their neighbourhoods.

Education can also increase democratic participation and voting. While there is abundant evidence that education correlates strongly with social trust and social participation, there is also growing evidence to suggest that the relationship is causal. Some of the returns from education – including its effects on economic growth, taxes and transfers, crime and health – accrue to society at large rather than to individuals. Therefore, the social returns on education are likely to be significantly larger than the already sizeable private returns.

The report focuses on the social and economic resilience that might be achieved by well-designed and well-targeted investment in education. We show that European countries, which are endowed with better education in terms of both quantity and quality, recover faster from economic shocks, and their economies are more resilient in the short and medium run. The report discusses the connection between income inequality and educational inequality, and argues that programmes supporting access to high-quality preschool education for disadvantaged children are instrumental in tackling existing

inequalities within a society. The role of education is also considered in the context of technological advances and changing demands for skills associated with the dissemination of new technologies, including skills that increase the ability to adjust to a rapidly changing world, such as specific soft skills, skills in STEM and digital skills.

We also discuss the challenges for the European education systems following the extensive lockdown of schools and universities during the 2020 Covid-19 pandemic, and the associated disruption at the global level of schooling and learning. We offer an overview of the recent estimates of learning losses and their implications for future opportunities, including diminishing economic benefits in terms of future earnings.

Aperçu des résultats

Ce rapport met l'accent sur la résilience sociale et économique qui pourrait être obtenue en investissant de façon bien pensée et bien ciblée dans l'éducation. Il examine les bénéfices de l'éducation pour la société et les individus en termes de retombées économiques et non économiques. Au niveau des individus, parmi les avantages économiques les plus importants, citons des compétences plus élevées, une meilleure employabilité, une productivité accrue et des revenus plus élevés. Parmi les avantages non économiques associés à l'éducation, citons une meilleure santé, un taux de criminalité plus faible et des niveaux plus élevés de confiance, de tolérance et d'engagement civique et politique. Au niveau de la société, parmi les avantages associés à l'éducation, citons une croissance plus élevée du PIB, une meilleure diffusion et adoption des technologies, une plus grande capacité d'innovation, une plus grande stabilité des finances publiques et une meilleure cohésion sociale.

Le rapport montre que les pays européens dotés d'une meilleure éducation, tant en termes de quantité que de qualité, se remettent plus rapidement des chocs économiques et présentent une meilleure résilience économique. Il démontre également que les individus plus instruits font preuve d'une plus grande flexibilité et d'une plus grande capacité d'adaptation aux nouvelles avancées technologiques, et traite des compétences spécifiques qui devraient être les plus demandées à l'avenir. Il met en évidence que l'accès à un enseignement maternel de qualité pour les enfants défavorisés est l'une des politiques les plus importantes pour lutter contre les inégalités au sein d'une société.

Le rapport examine également les conséquences des fermetures d'écoles liées à la pandémie de COVID-19 au début de 2020 sur les individus (étudiants, enseignants et parents) et les institutions et systèmes éducatifs. Selon le rapport, si elles ne sont pas traitées de manière adéquate au cours de la reprise, les conséquences négatives immédiates (ex. : interruption de l'apprentissage et de l'acquisition de compétences, exacerbation des inégalités éducatives et augmentation du taux d'abandon scolaire) pourraient entraîner des coûts sociaux et économiques élevés à long terme.

Résumé

L'éducation favorise la croissance économique et la cohésion sociale. Elle joue un rôle essentiel dans la prospérité des individus et des sociétés et est indispensable au développement et au bien-être personnels. Investir dans l'éducation apporte des bénéfices substantiels à long terme pour les individus, les finances publiques et l'économie du savoir dans son ensemble. L'examen des différentes politiques menées au cours des cinquante dernières années indique que l'investissement dans l'éducation et la mise en place de politiques de santé présentent le taux de rentabilité le plus élevé. Selon différentes estimations microéconomiques et macroéconomiques, le taux de rentabilité d'un investissement dans le capital humain est significatif, surtout au regard d'autres possibilités d'investissement.

Dans l'ensemble, l'éducation stimule la productivité et encourage l'innovation nécessaire pour dynamiser l'économie. Elle augmente les possibilités de recyclage professionnel et d'évolution de carrière, ainsi que la capacité du personnel à s'adapter aux changements sur le lieu de travail résultant des évolutions technologiques ou des changements des caractéristiques essentielles des professions. Au vu de la relation étroite entre l'éducation et les revenus, un niveau d'éducation plus élevé profite également aux finances publiques.

Les bénéfices attendus de l'éducation vont au-delà des revenus et de l'emploi ; ils se constatent également, par exemple, dans les niveaux de santé, de longévité, de bonheur et de respect de l'environnement. Il existe une corrélation positive entre l'éducation et la santé dans les pays européens. Une éducation plus poussée et de meilleure qualité peut également réduire les activités criminelles en augmentant les possibilités de travail légitime à l'avenir, ce qui décourage la participation aux activités criminelles, et en influençant l'ensemble des personnes avec lesquelles les individus interagissent quotidiennement à l'école, au travail ou dans leur quartier.

L'éducation peut également accroître la participation démocratique et les taux de participation aux élections. S'il existe de nombreuses preuves de la forte corrélation entre l'éducation et la confiance et la participation sociales, il existe également de plus en plus de preuves de la causalité de cette relation. Certains des bénéfices de l'éducation — y compris ses effets sur la croissance économique, les impôts et les transferts, la criminalité et la santé — reviennent à la société dans son ensemble plutôt qu'aux individus. Par conséquent, les bénéfices sociaux de l'éducation sont susceptibles d'être sensiblement plus importants que les bénéfices privés, déjà considérables.

Le rapport met l'accent sur la résilience sociale et économique qui pourrait être obtenue en investissant de façon bien pensée et bien ciblée dans l'éducation. Il montre que les pays européens dotés d'une meilleure éducation, tant en termes de qualité que de quantité, se remettent plus rapidement des chocs économiques et présentent une meilleure résilience économique à court et moyen termes. Le rapport examine le lien entre l'inégalité salariale et l'inégalité en matière d'éducation et fait valoir que les programmes de promotion de l'accès à un enseignement maternel de qualité pour les enfants défavorisés sont essentiels pour lutter contre les inégalités au sein d'une société. Le rôle de l'éducation est également considéré dans le contexte des avancées technologiques et de l'évolution de la demande de compétences associées à la diffusion des nouvelles technologies, y compris les compétences qui améliorent la capacité d'adaptation à un monde en mutation rapide, telles que les compétences non techniques, les compétences STIM (sciences, technologies, ingénierie et mathématiques) et les compétences numériques.

Le rapport aborde également les défis auxquels sont confrontés les systèmes éducatifs européens à la suite de la fermeture généralisée des écoles et des universités pendant la pandémie de COVID-19 de 2020 et de la perturbation connexe de la scolarisation et de l'apprentissage au niveau mondial. Nous vous proposons un aperçu des estimations récentes des pertes d'apprentissage et de leurs conséquences sur les possibilités futures, notamment la diminution des avantages économiques en termes de revenus futurs.

Die Ergebnisse im Überblick

Dieser Bericht befasst sich insbesondere mit dem Thema der sozialen und wirtschaftlichen Widerstandsfähigkeit, die durch gut konzipierte und zielgerichtete Bildungsinvestitionen erreicht werden könnte. Außerdem wird darin die Frage der individuellen und sozialen Bildungsrendite unter dem Aspekt sowohl der wirtschaftlichen als auch der nichtwirtschaftlichen Auswirkungen behandelt. Zu den wichtigsten ökonomischen Vorteilen für den Einzelnen gehören gesteigerte Kompetenzen, bessere Beschäftigungsfähigkeit, höhere Produktivität und höhere Einkünfte. Zu den sonstigen Vorteilen, die mit Bildung verbunden sind, zählen eine bessere Gesundheit, niedrigere Kriminalitätsraten und ein höheres Maß an Vertrauen, Toleranz sowie bürgerschaftlichem und politischem Engagement. Auf gesellschaftlicher Ebene schlägt sich ein höheres Bildungsniveau in einem stärkeren BIP-Wachstum, einer besseren Verbreitung und Übernahme von Technologien, einer höheren Innovationskapazität, stabilen öffentlichen Finanzen und größerem sozialen Zusammenhalt nieder.

Wir zeigen, dass europäische Länder, die sowohl in quantitativer als auch qualitativer Hinsicht über eine bessere Bildung verfügen, sich schneller von wirtschaftlichen Schocks erholen und eine höhere wirtschaftliche Widerstandsfähigkeit aufweisen. Außerdem liefern wir Belege dafür, dass Menschen mit höherem Bildungsniveau flexibler und anpassungsfähiger gegenüber technologischen Fortschritten sind, und gehen näher auf die in Zukunft voraussichtlich gefragtesten Fachkompetenzen ein. Wir weisen darauf hin, dass der Zugang zu hochwertiger vorschulischer Bildung und Erziehung für benachteiligte Kinder eine der wichtigsten Maßnahmen ist, um bestehende Ungleichheiten innerhalb einer Gesellschaft abzubauen.

In dem Bericht werden die Auswirkungen der Anfang 2020 erfolgten Schulsperren im Zusammenhang mit COVID-19 auf Einzelpersonen (Schüler, Lehrkräfte und Eltern) sowie Bildungseinrichtungen und -systeme erörtert und hervorgehoben, dass die unmittelbaren negativen Folgen wie z. B. unterbrochener Unterricht und Kompetenzerwerb, verschärfte Bildungsungleichheiten und steigende Abbrecherquoten ohne angemessene Abhilfemaßnahmen während der Erholungsphase langfristig zu hohen sozialen und wirtschaftlichen Kosten führen könnten.

Zusammenfassung

Bildung fördert Wirtschaftswachstum und sozialen Zusammenhalt. Sie spielt eine maßgebliche Rolle für den individuellen und gesellschaftlichen Wohlstand und ist von entscheidender Bedeutung für die persönliche Entwicklung und das Wohlergehen. Investitionen in Bildung bringen erhebliche langfristige Vorteile für den Einzelnen, die öffentlichen Finanzen und die wissensbasierte Wirtschaft insgesamt. Eine Auswertung der verschiedenen politischen Maßnahmen im letzten halben Jahrhundert ergibt, dass Investitionen in Bildung, neben dem Gesundheitswesen, die höchste Rendite bringen. Der Ertrag von Investitionen in Humankapital ist verschiedenen mikro- und makroökonomischen Schätzungen zufolge beträchtlich, insbesondere im Vergleich zu alternativen Investitionsmöglichkeiten.

Insgesamt trägt Bildung zur Erhöhung der Arbeitsproduktivität bei und ist Impulsgeber für Innovationen, die die Wirtschaft voranbringen. Sie begünstigt Umschulungen und die berufliche Entwicklung sowie die Anpassungsfähigkeit der Arbeitskräfte gegenüber Veränderungen am Arbeitsplatz infolge technologischer Entwicklungen und/oder einem grundlegenden Wandel des Berufsbilds. Aufgrund des engen Zusammenhangs zwischen Bildung und Einkommen kommt ein höheres Bildungsniveau auch den öffentlichen Finanzen zugute.

Der erwartete Nutzen von Bildung beschränkt sich nicht auf die Bereiche Einkommen und Beschäftigung, auch Aspekte wie Gesundheit, Lebenserwartung, Glück, umweltfreundliches Verhalten usw. werden positiv beeinflusst. Es besteht eine positive Wechselwirkung zwischen Bildung und Gesundheit in den europäischen Ländern. Mehr und bessere Bildung kann auch die Kriminalität verringern, denn die Perspektive auf legale Arbeitsmöglichkeiten hält Menschen eher davon ab, sich an Straftaten zu beteiligen, und dies auch durch den veränderten Personenkreis, mit dem der Einzelne täglich in der Schule, am Arbeitsplatz oder in seiner Nachbarschaft zu tun hat.

Bildung kann auch dazu beitragen, die demokratische Teilhabe und die Wahlbeteiligung zu erhöhen. Es ist zwar hinlänglich belegt, dass ein starker Zusammenhang zwischen Bildung und sozialem Vertrauen bzw. gesellschaftlicher Teilhabe besteht, es gibt aber auch immer mehr Hinweise darauf, dass diese Beziehung kausal ist. Ein Teil des Bildungsnutzens, darunter die Auswirkungen auf Wirtschaftswachstum, Steuern und Transferleistungen, Kriminalität und Gesundheit, betrifft nicht die individuelle Ebene, sondern kommt der Gesellschaft insgesamt zugute. Die soziale Bildungsrendite ist daher wahrscheinlich erheblich größer als der bereits beträchtliche private Nutzen.

Dieser Bericht befasst sich insbesondere mit dem Thema der sozialen und wirtschaftlichen Widerstandsfähigkeit, die durch gut konzipierte und zielgerichtete Bildungsinvestitionen erreicht werden könnte. Wir zeigen, dass europäische Länder, die sowohl in quantitativer als auch qualitativer Hinsicht über eine bessere Bildung verfügen, sich schneller von wirtschaftlichen Schocks erholen sowie kurz- und mittelfristig eine höhere wirtschaftliche Widerstandsfähigkeit aufweisen. In dem Bericht wird der Zusammenhang zwischen Einkommens- und Bildungsungleichheit erörtert und argumentiert, dass Programme zur Förderung des Zugangs benachteiligter Kinder zu hochwertiger vorschulischer Bildung und Erziehung entscheidend dazu beitragen, bestehende Ungleichheiten innerhalb einer Gesellschaft abzubauen. Die Rolle der Bildung wird auch im Kontext des technologischen Fortschritts und der neuen Kompetenzanforderungen im Zusammenhang mit der Verbreitung neuer Technologien betrachtet, darunter spezifische Soft Skills, MINT-Qualifikationen und digitale Kompetenzen zur Verbesserung der Anpassungsfähigkeit an eine sich rasch verändernde Welt.

Wir gehen auch auf die Herausforderungen für die europäischen Bildungssysteme infolge der großflächigen Schul- und Universitätssperren während der Covid-19-Pandemie im Jahr 2020 und die damit verbundenen Störungen in Bezug auf die Schulbildung und das Lernen im Allgemeinen ein. Schließlich enthält der Bericht noch einen Überblick über die jüngsten Schätzungen der Lernverluste und die entsprechenden Auswirkungen auf künftige Möglichkeiten, einschließlich des abnehmenden wirtschaftlichen Nutzens in Bezug auf zukünftige Einkünfte.

1. Introduction

The prolonged lockdown affecting Europe during the spring of 2020 as a consequence of the Covid-19 pandemic affected schools and universities, replacing traditional teaching and learning practices with distance learning. It caused significant “shock effects” for individuals (students, teachers and parents), educational institutions and education systems. Recent estimates for France, Italy and Germany¹ suggest that, on average, EU students will suffer learning losses because of the lockdown, and a reduced acquisition of both cognitive and non-cognitive skills. If not tackled adequately during the recovery stage, the immediate adverse consequences – such as interrupted learning and skills formation, exacerbated educational inequalities and rising dropout rates² – could imply high social and economic costs in the long term.

In these circumstances, investing in education and skills is crucial for economic growth and competitiveness, as well as for individual and social welfare, trust and cooperation,³ support for democratic and civic values and the quality of institutions.⁴ The recently adopted Recovery and Resilience Facility⁵ provides new opportunities for EU member states to invest smartly in order to address existing educational challenges and to find more resilient models of providing quality education for all.

The current report focuses on the social and economic resilience that might be achieved by well-designed and well-targeted investment in education. It starts by reviewing the benefits of education in terms of direct economic effects – higher wages and lower unemployment – and the broader benefits, for example higher government revenues, economic development, innovation and higher productivity. It points out that the social returns of education are also very high in terms of better health, lower crime, green behaviours and resilient and cooperative societies. It shows that the rate of return on

¹ Di Pietro, G., Fiagi, F., Costa, P., Karpinski, Z & Mazza, J., 2020, The likely impact of Covid-19 on education: Reflections based on the existing literature and international datasets, EUR 30275 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-19937-3, doi:10.2760/126686, JRC121071.

² UNESCO, 2020, Covid-19 educational disruption and response. See: <https://en.unesco.org/covid19/educationresponse>.

³ Algan, Y., Cahuc, P. & Shliefer, A., 2013, Teaching practices and Social Capital, *American Economic Journal: Applied Economics*, Vol. 5, No. 3, pp. 189-210

⁴ Algan, Y. & Cahuc, P., 2014, Trust, growth, and well-being: New evidence and policy implications. In Aghion, P. & Durlauf, S. (Eds), *Handbook of economic growth*, Amsterdam: Elsevier, Vol. 2, 49-120

⁵ The Recovery and Resilience Facility consists of large-scale financial support for public investments and reforms in order to make economies in the EU countries more resilient and better prepared for the future. The support will take the form of up to €310 billion in grants and up to €250 billion in loans. The Facility will be demand driven and powered by an emergency European Recovery Instrument, “Next Generation EU”. See: https://ec.europa.eu/info/sites/info/files/2020mff_covid_recovery_factsheet.pdf.

investing in human capital is very significant (around 9-10% according to micro and macro estimates) especially when compared to alternative investment opportunities.

The paper also discusses the effects of recent waves of technological progress – including digitalisation and automation – on the demand for skills. It considers the impact of education on inequality, and discusses its effects on economic resilience, or the ability of countries to recover quickly from economic shocks. Finally, it reflects on the implications of Covid-19 on the organisation of learning. Conclusions follow.

2. Benefits of education

2.1 The private economic benefits of education

Education fosters economic growth and social cohesion,⁶ plays a critical role in individual and societal prosperity, and is essential for personal development and welfare. Its benefits have multiple dimensions (see Table 1). Investment in education provides substantial long-term gains for individuals, public finances and the knowledge-based economy as a whole.⁷ Looking at all the different policies in the past half-century, investment in education, along with health policy, is associated with the highest rate of return.

Table 1. The benefits of education and training

Type of benefits	Private (for the individual)	Societal (for the community/society)
Economic	<ul style="list-style-type: none"> - Better cognitive skills and higher employability - Improved individual labour productivity - Higher earnings - Additional fringe benefits - Reduced risk of unemployment - Better working conditions - Higher labour market flexibility - Improved labour market mobility - Higher consumer efficiency 	<ul style="list-style-type: none"> - Increased labour force productivity - Higher net tax revenues - Better technological diffusion - Higher innovation capacity - Higher economic growth

⁶ Janmaat, J., Duru-Bellat, M., Mehaut, P. & Green, A., 2013, *The Dynamics and Social Outcomes of Education Systems*. Education, Economy and Society Series. Palgrave Macmillan.

⁷ See Hendren, N and Sprung-Keyser, B. 2020, *A Unified Welfare Analysis of Government Policies* (<https://academic.oup.com/qje/advance-article/doi/10.1093/qje/qjaa006/5781614>), and Diris, R and Ooghe, E. 2017, *The Economics of Financing Higher Education*: (<https://pdfs.semanticscholar.org/274c/f4b0f5cffda1e16b3b153bb7f6e6e7e33c5d.pdf>).

Non-economic/ non-pecuniary	<ul style="list-style-type: none"> - Better health status - Increased life expectancy - Reduced crime activity - Reduced recidivism - Lower dependence on social assistance - Higher levels of trust in others and cooperation - High levels of tolerance and acceptance - Increased civic and political engagement and quality of institutions - Better early childhood development (child cognitive development and health status) 	<ul style="list-style-type: none"> - Reduced public spending on medical care and treatment - Reduced spread of infectious diseases to others - Reduced public spending on police, court system and the prison system - Reduced public spending on social assistance - Reduced alienation and social inequalities - Better social cohesion - Environmental sustainability - Increased democratic participation and voting
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Source: own classification based on existing literature.

Educational attainment is a strong determinant of labour market outcomes in terms of access to employment, level of earnings and individual labour productivity.⁸ When education systems fail to provide the majority of the population with an education that is adequate for the economic, social and personal demands of modern life, the consequences are both personal (increased risk of unemployment and higher risk of poverty) and social (considerable social inequalities and social exclusion, increased public expenditure on health, crime and justice, and increased cost of provision of social assistance and financial instability of the social security systems).⁹

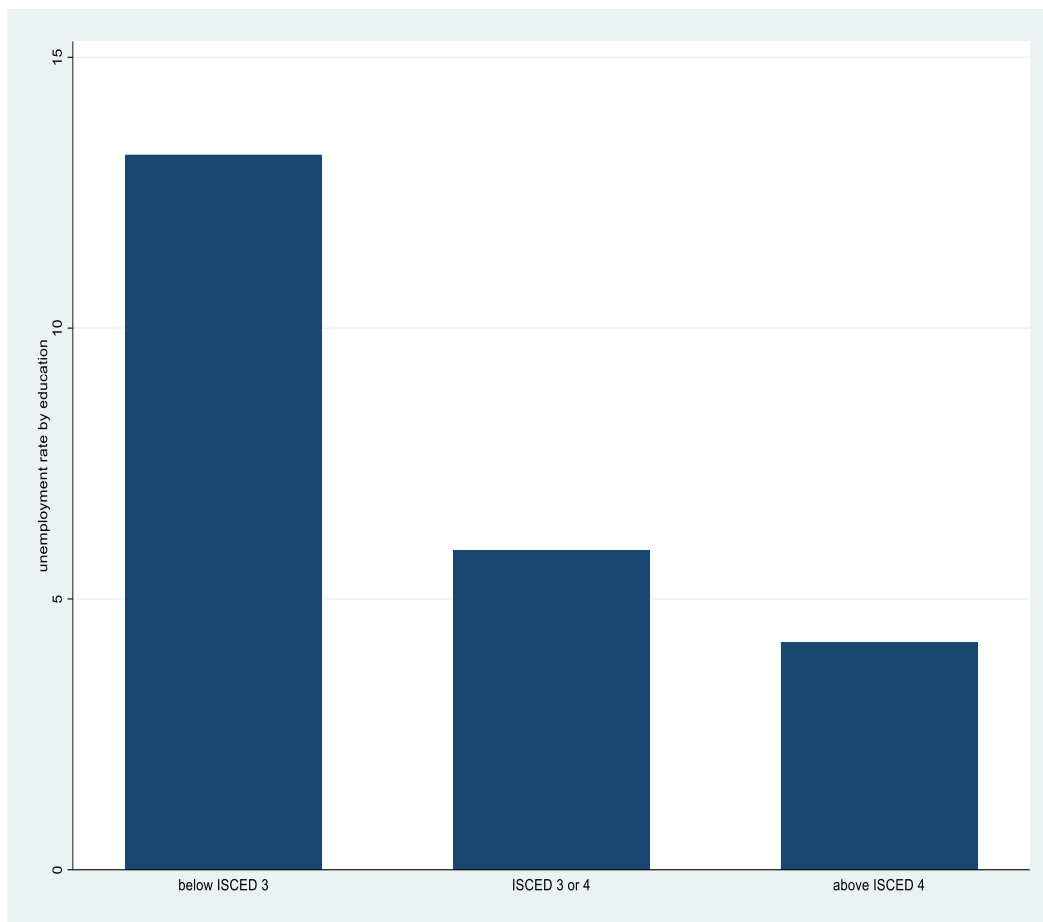
From an individual point of view, education constitutes an investment in knowledge, skills and competencies that improves personal labour market outcomes. As with other investments, the economic justification of investment in education depends on its achieved rate of return. The private internal rate of return on education can be defined as the discounted lifetime benefits (better pay and lower risk of unemployment – see Figure 1)¹⁰ minus the net present value of both direct costs (educational fees and other related expenses) and indirect costs (foregone earnings while studying). Individual investment in education is justified as a rational choice if this rate of return is positive and higher than the private discount rate.

⁸ Wossmann, L. 2014, The economic case for education, EENEE Analytical Report No. 20, European Expert Network on Economics of Education.

⁹ Belfield, C. & Levin H., 2007, *The Price We Pay: Economic and Social Consequences of Inadequate Education* (pp. I-IV), Washington, D.C.: Brookings Institution Press.

¹⁰ The unemployment gap between ISCED 3 (upper secondary education) and higher ISCED (post-secondary and tertiary) is starker when we consider the young age group (25-29).

Figure 1. Unemployment rate by educational attainment (2018). Individuals aged 15 to 74 in EU27



Note: below ISCED 3: below upper secondary education; ISCED 3: upper secondary; ISCED 4: post-secondary non-tertiary; above ISCED 4: tertiary.

Source: Eurostat.

There are a growing number of empirical studies systematically providing estimates of the private returns on education. A recent meta-analysis based on 139 countries over several years showed that, on a global level, the private rate of return on one extra year of schooling is on average about 9% a year.¹¹ This rate is lower in advanced economies – around 8% (7.3% in Europe) – than in low-income countries,¹² where average attainment is lower (see Table 2).

¹¹ Psacharopoulos, G. & Patrinos, H., 2018. Returns to Investment in Education: A Decennial Review of the Global Literature. Policy Research Working Paper; No. 8402. World Bank, Washington, D.C.

¹² Ibid.

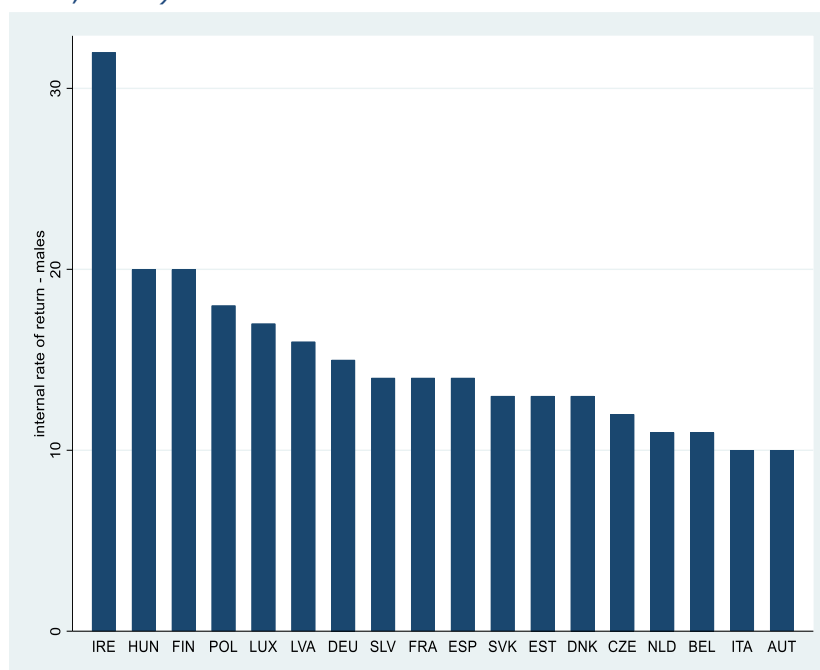
Table 2. Private return on one additional year of schooling, by region

Region	Rate of return (%)	Mean years of schooling
Latin America and Caribbean	11.0%	7.3
Sub-Saharan Africa	10.5%	5.2
East Asia and Pacific	8.7%	6.9
South Asia	8.1%	4.9
Advanced economies	8.0%	9.5
Europe and Central Asia	7.3%	9.1
Middle East and North Africa	5.7%	7.5
World average	8.8%	8.0

Source: Psacharopoulos & Patrinos (2018).

In Europe, the average internal rate of return on a higher education degree compared to an upper secondary diploma is 19% for women and 15% for men (the OECD average is 21% and 17% respectively).¹³ Figures 2 and 3 report these rates for the countries for which the data are available, separately by gender. There is substantial variation across European countries, with the estimated rate ranging from more than 30% for Irish men to 10% for Italian and Austrian men, and from over 50% for Irish women to only 10% for Austrian and Czech women.

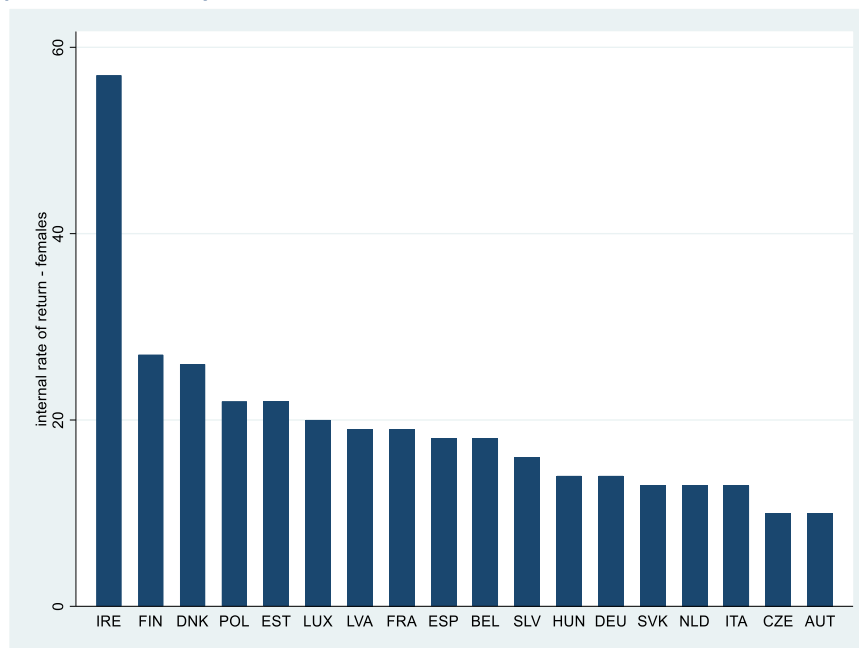
Figure 2. Estimated internal rate of return: tertiary education relative to upper secondary (males, 2016)



Note: in equivalent USD converted using PPPs for GDP; future costs and benefits are discounted at a rate of 2%.
Source: OECD, Education at a glance, 2019.

¹³ See OECD, Education at a glance 2019, Paris

Figure 3. Estimated internal rate of return: tertiary education relative to upper secondary (females, 2016)



Note: see Figure 2.

In order to interpret these rates of return as the causal impact of education on earnings, we would need educational attainment to be randomly allocated to individuals. In real life, of course, this is not the case, because individuals choose their desired level of education based on preferences and cognitive and non-cognitive abilities.

Applied economists have tried to control for selection into education and reproduce a situation as similar as possible to random allocation by relying on the exogenous variation in educational attainment induced by changes in compulsory schooling laws, which have increased the minimum required years of education over time in several European countries. They have interpreted as causal the variation of returns associated with the change in education driven by these reforms.¹⁴ A potential drawback of this approach is that the estimated causal effects do not apply to the average individual, but to the individuals who altered their educational choices as a result of these reforms. Since compulsory school reforms in Europe typically affected lower and upper secondary education, these causal estimates are not informative about the effect of tertiary education on earnings.¹⁵

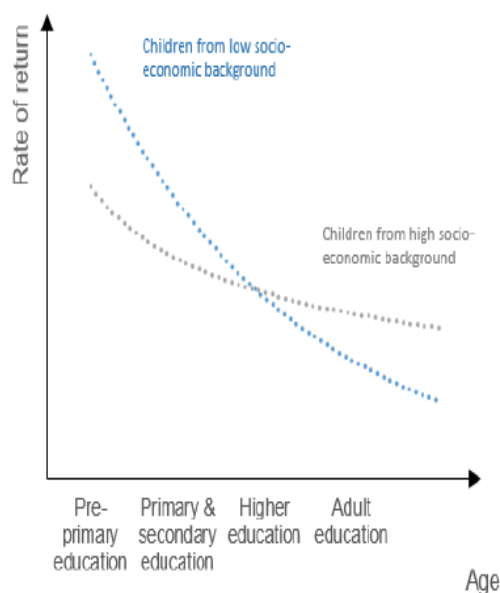
¹⁴ See for instance Oreopoulos, P., 2006, Estimating Average and Local Average Treatment Effects of Education when Compulsory Schooling Laws Really Matter, *American Economic Review*, Vol. 96, No.1, pp.152-175.

¹⁵ The identification of the causal effects of college education would require the use of a source of exogenous variation affecting college students, such as college proximity. See for instance Card, D., 1995, Using

Estimates of the causal impact of education on earnings over the lifetime for nine European countries (Austria, Belgium, Czech Republic, Denmark, France, Germany, Italy, Netherlands and Sweden) indicate that one additional year of schooling increases earnings over the life cycle by about 9% on average, very close to the number discussed above. In a similar vein, evidence for Norway suggests that an additional year of schooling yields an internal rate of return of around 11%. In France, evidence drawn from the events of 1968, which led to looser standards for obtaining the baccalaureate and to a massive opening of higher education for the cohort born in 1949, shows that each additional year of higher education translates into a 14% wage rise.¹⁶

A key aspect of the returns on education is that “learning begets learning”: early investment in education facilitates the acquisition of further education and training investment over the life cycle. As shown in Figure 4, investment in education is especially effective when it targets young and underprivileged individuals.

Figure 4. The rate of return on investing in human capital, by age



Source: Cunha, F. et al. (2006), *Interpreting the Evidence on Life Cycle Skill Formation*, in E. A. Hanushek and F. Welch (eds.), *Handbook of the Economics of Education*, Vol. 1, North-Holland, Amsterdam, adapted by EENEE³³

Geographic Variation in College Proximity to Estimate the Return to Schooling. In *Aspects of Labour Market Behaviour: Essays in Honour of John Vanderkamp*, ed. Christofides, L., Grant, E. and Swidinsky R., 201-22. Toronto: University of Toronto Press.

¹⁶ Causal effects are identified using the variation across cohorts and countries in compulsory education. See Brunello, G., Weber, G. & Weiss, C., 2017, Books are Forever: Early Life Conditions, Education and Lifetime Earnings in Europe, *Economic Journal*, Vol. 127, Issue 600, pp.271-96; Bhuller, M., Mogstad, M. & Salvanes, K., 2017, Life Cycle Earnings, Education Premiums and Internal Rates of Returns, *Journal of Labor Economics*, Vol. 35, No. 4, pp.145-189; Maurin, E. & McNally, S., 2008, Vive la Révolution! Long-Term Educational Returns of 1968 to the Angry Students. *Journal of Labor Economics*. Vol. 26, No.2, pp. 1-33.

2.1.1 The benefits of vocational education and training (VET)¹⁷

Initial education is central to sustainable labour market integration and to reducing inequality, and subsequent training cannot substitute for it. To gain from training, participants have to “know how to learn”. Rapid technical change and the rising demand for labour market adaptability and the ability to move from job to job raise questions concerning the design of school curricula. Compared to the United States, many European countries organise their upper secondary schools into separate vocational and academic curricula (or tracks).¹⁸ In fact, about 50% of EU students in upper secondary education are enrolled in vocational programmes.¹⁹

Vocational education is important because it provides specialised technical skills. It also helps keep individuals in education who are not attracted by more academic studies, and provides ready-to-use skills that can address short-term labour shortages. However, individuals with a vocational education frequently face a trade-off between short-term advantages and long-term disadvantages. In the short term, vocational education facilitates the transition from school to work by providing ready-to-use skills.²⁰ In 2019, 77.1% of EU27 VET graduates without a college education (ISCED levels 3 and 4) had a job one year after graduation, compared to 60.1% of general education graduates without college (ISCED-2011 levels 3 and 4).²¹ In the long term, however, vocational skills depreciate relatively quickly, and VET graduates are less able to adapt to technical change than individuals with a more academically oriented education.²²

Does a vocational education produce higher private benefits than a more academic education? Answering this question is difficult²³ because the simple correlation between

¹⁷ The European Commission defines vocational education and training (VET) as “a key element of lifelong learning systems, which equip citizens with knowledge, skills and competences required in particular occupations and on the labour market” See: https://ec.europa.eu/education/policies/eu-policy-in-the-field-of-vocational-education-and-training-vet_en.

¹⁸ Carruthers, C. & Jepsen, C., 2019, Vocational education: an international perspective, mimeo.

¹⁹ Based on Eurostat and joint UNESCO/OECD/Eurostat (UOE) data. The country-specific outcomes of VET programmes not only depend on the organisation of these programmes, but also on the organisation of the national labour markets. In countries such as Germany and many Eastern European countries, access to specialist jobs is much more degree-based than in Anglophone countries, where it is more common to recruit candidates with a general education who can learn the necessary skills on the job.

²⁰ VET graduates also earn more than college graduates in their first years of work.

²¹ Source: Eurostat. One should keep in mind, however, that in countries with significant rates of higher educational attainment among the younger generations, general upper secondary education is rarely designed for labour market integration, but rather as a step towards higher education.

²² Hanushek, E., Schwerdt, G, Woessmann L and Zhang, L. 2017, “General Education, Vocational Education, and Labour-Market Outcomes over the Life-Cycle.” *Journal of Human Resources*, Vol. 52, No. 1, pp.48-87.

²³ Another difficulty is that the definition of what is considered (secondary) VET is extremely heterogeneous across the EU: in some countries (e.g. Cyprus) it is mostly for direct entry into manual jobs. Other countries have VET programmes that are designed to prepare pupils for higher education (e.g. Belgium). German VET schools only start at the age of 16, after a relatively long period of general skills building, and are very closely intertwined with the labour market (with extensive work placements). In other words, it is very difficult to put

education type, employment and earnings is affected by the fact that individuals choose their preferred curriculum. On the one hand, VET seems to provide better employment opportunities for young people in most of the EU countries. In 2018, upper secondary VET graduates in the 20-34 year age group had an average employment rate of 80.5%, which was 6.6% higher than the employment rate of their peers with a secondary general education, and about 23% higher than the average employment rate of their peers with a lower educational level.²⁴

On the other hand, the few studies that have been able to disentangle the private returns on vocational education from the selection of education type suggest that the observed differences in average earnings across education curricula are entirely driven by the fact that individuals with different abilities select vocational and academic tracks.²⁵

A tension exists between firms with skills shortages advocating more vocational education and individuals facing an uncertain professional future and the risks of automation and technical progress, who try to diversify these risks by choosing broader educational curricula. Indeed, several studies show that with new technologies and the growth of automation, the number of low-skilled, routine jobs is likely to decrease to the profit of high-skilled and/or non-routine ones.²⁶ Increasing the permeability of VET systems and options for lifelong learning might be steps to mitigate these tensions.²⁷

2.1.2 The returns on training and adult learning

As labour markets are increasingly dynamic, jobs and the task content of jobs are subject to fast changes. This underlines the need for continued engagement in learning throughout individual careers. Studies using data from several countries have often estimated substantial returns on private-sector training: while the estimated wage

all VET programmes across the EU in the same basket and compare their outcomes with academic programmes. Another complicating factor is the unbalanced gender selection into different tracks – with women more often choosing general tracks and showing significant gaps in employment at childbearing age in some EU countries.

²⁴ Cedefop, 2019. On the way to 2020: data for vocational education and training policies. Indicator overviews, 2019 update. See also OECD, 2020, *Employment Outlook*, Paris.

²⁵ See Malamud, O. & Pop-Eleches, C., 2010, "Academic education versus vocational training: evidence from an economy in transition", *Review of Economics and Statistics*, Vol. 92, No 1, pp. 43-60; Oosterbeek, H. & Webbink, D., 2007, Wage Effects of an Extra Year of Basic Vocational Education, *Economics of Education Review*, Vol. 26, No. 4, pp. 408-19; Hall, C., 2012, "The Effects of Reducing Tracking in Upper Secondary School: Evidence from a Large-Scale Pilot Scheme", *Journal of Human Resources*, Vol. 47, No.1, pp. 237-69.

²⁶ See for example Maurin, E. & Thesmar, D., 2004, Changes in the Functional Structure of Firms and the Demand for Skill, *Journal of Labor Economics*, University of Chicago Press, Vol. 22, No. 3, pp. 639-664 or Mas, C., Faquet, R. & Roulleau, G., 2020, Can low-skilled workers benefit from innovation in France?, *Trésor-Economics* n°260.

²⁷ Brunello, G. & Wruuck, P., 2019, Skill Shortages and Skill Mismatch in Europe: A Review of the Literature, IZA Discussion Paper N.12346.

returns on a year of full-time education are around 10%, the returns on a week of private-sector training are often placed at 3%.²⁸

However, these high returns may partly reflect the fact that high-ability workers have higher earnings and are more likely to be training recipients. The identification of the causal effect of training on wages requires a source of exogenous variation, which mimics the random assignment of workers to training, a difficult task. The few studies that have managed to empirically control for the non-random selection into training have found that the estimated causal effect of training on wages are positive but substantially lower than the simple correlation between training and wages.

Using naive estimates, Leuven and Oosterbeek, 2008, find for instance that in the Netherlands, participation in one training course with a median duration of 40 hours increases wages by 9.5%. When they restrict the comparison to workers who wanted to participate in training but did not because of some random event, the estimated wage return declines to 1%. These results are confirmed using German and Italian data.²⁹

Since most training is provided and organised by the employer, we expect it to affect productivity and profits. Evidence from Belgium shows that a 10% increase in the share of trained workers is associated with 1.7 to 3.2% higher productivity. This increase in productivity is not entirely offset by a similar increase in wage, which rises only by 1 to 1.7%.³⁰ Additional evidence using data from EU27, as well as from the United Kingdom, documents that investing €100 per employee in training increases firm productivity by roughly 1.5%.³¹

The unequal distribution of the risks associated with automation requires policies that can prepare workers for the new job requirements. Adult learning is an essential policy instrument for the retraining and upskilling of workers whose jobs are affected by technological change. Unfortunately, existing evidence suggests that the odds of participating in any type of training, either on-the-job or outside the job, are significantly lower among workers whose jobs are at risk of being automated. In particular, workers

²⁸ Oosterbeek, H., 2013, The Financing of Adult Learning, EENEE Analytical Report No. 15.

²⁹ Leuven, E. & Oosterbeek, H., 2008. An alternative approach to estimate the wage returns to private-sector training. *Journal of Applied Econometrics*, Vol. 23, No.4, pp. 423-434; Görlitz, K., 2011. Continuous training and wages: An empirical analysis using a comparison-group approach. *Economics of Education Review*, Vol. 30, pp.691-701; Brunello, G., Comi, S. and Sonedda, D., 2012, Training subsidies and the wage returns to continuing vocational training, *Labour Economics*, Vol.19, No.3, pp. 361-372.

³⁰ Konings, J. & Vanormelingen, W., 2015, The impact of training on productivity and wages: Firm-level evidence. *Review of Economics and Statistics*, Vo. 97, No. 2, pp. 485-97. See also Martins, P., 2020, Employee Training and Firm Performance: Quasi-Experimental Evidence from the European Social Fund, mimeo.

³¹ Brunello, G., Gereben, A., Weiss, C. & Wruuck, P., 2020, Financing Constraints and Employers' Investment in Training, European Investment Bank.

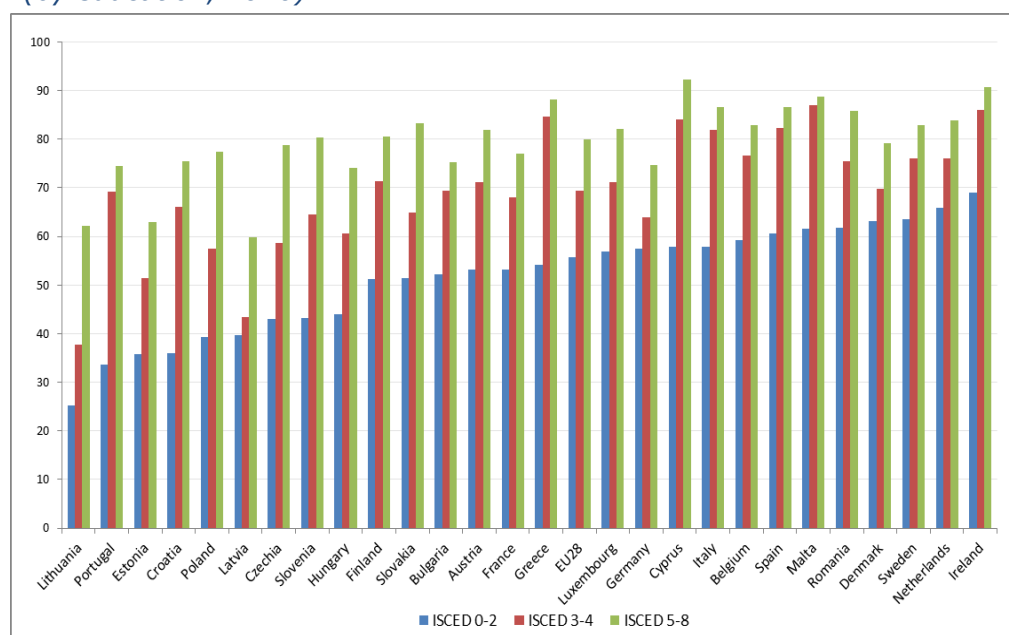
in fully automatable jobs are more than three times less likely to have participated in on-the-job training than workers in non-automatable jobs, over a 12-month period.³²

2.2 The non-economic and social benefits of education

The expected benefits of education go beyond earnings and employment, by affecting, for instance, health and longevity, happiness and pro-environmental behaviour.³³ We call these “non-economic benefits”. As private benefits spill over to other members of society beyond the individual, both economic and non-economic benefits can also accrue to society (social benefits).

As documented in Figures 5 and 6, there is a positive correlation between education and health amongst European countries. Reasons why this might happen include better decision making and information gathering, stress reduction, healthier employment, higher income and better neighbourhoods and peers (see Figure 7).³⁴

Figure 5. Share of individuals aged 16 or older declaring to be in good or very good health (by education, 2016)



Note: ISCED 0-2: below upper secondary education; ISCED 3-4: upper secondary and post-secondary (non-tertiary); above ISCED 4: tertiary.

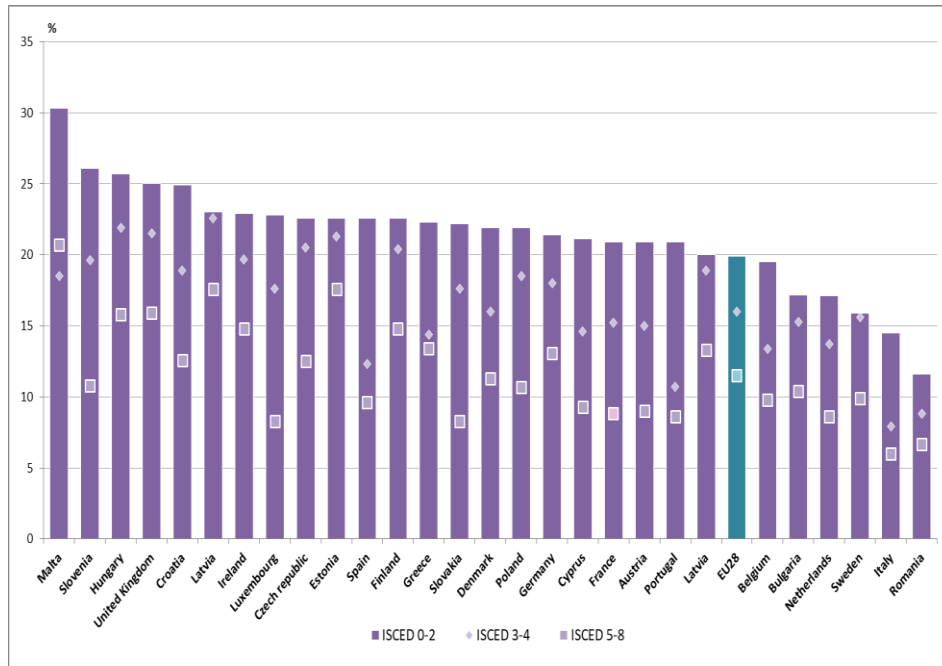
Source: Eurostat.

³² Nedelkoska, L. & Quintini, G., 2018, Automation, Skills Use and Training, OECD Social, Employment and Migration Working Papers No. 38. Technical Report 38, 2018.

³³ See Münich, D. & Psacharopoulos, G., 2018, Education externalities – What they are and what we know, EENEE Analytical Report No. 34, European Expert Network on Economics of Education.

³⁴ Lochner, L., 2011, Nonproduction Benefits of Education: Crime, Health and Good Citizenship, *Handbook of the Economics of Education*, Elsevier, Volume 4, pp. 183-282. Oreopoulos and Salvanes, 2011, Priceless: the nonpecuniary benefits of schooling. *Journal of Economic Perspectives*, Vol. 25, No.1, pp. 159-184.

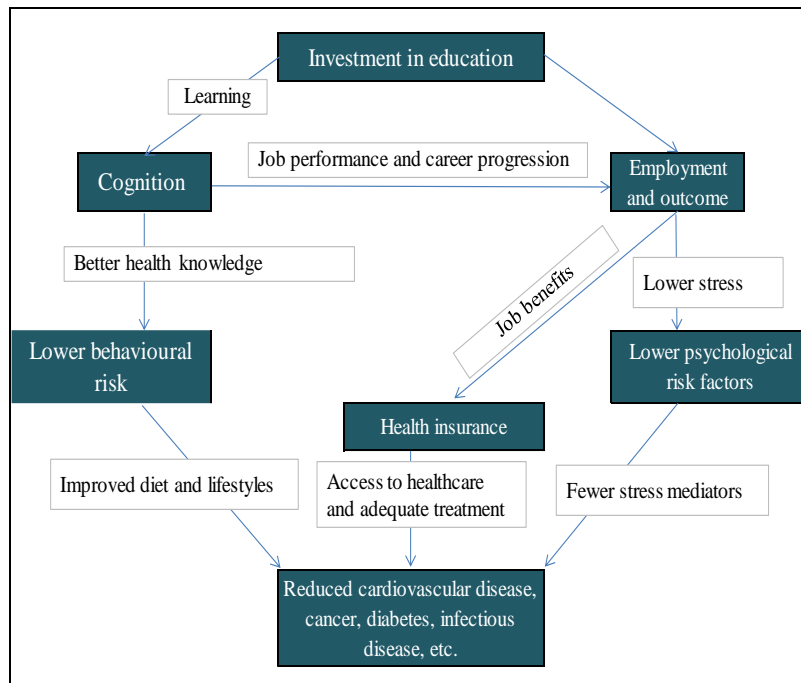
Figure 6. Share of obese individuals aged 18 or older. By education, 2014



Note: ISCED 0-2: below upper secondary education; ISCED 3-4: upper secondary and post-secondary (non-tertiary); above ISCED 4: tertiary.

Source: Eurostat.

Figure 7. Possible pathways through which investment in education can impact health outcomes



Source: adapted from Muennig, 2007.³⁵

³⁵ Muennig, P., 2007, Consequences in Health Status and Costs, in Belfield, C. & Levin, H. (2007), *The Price We Pay: Economic and Social Consequences of Inadequate Education*, Brookings Institution Press, Washington, D.C.

Although the correlation between education and health is positive, evidence establishing whether education has a causal effect on health is more mixed. Studies using data from several European countries find that a higher level of education reduces mortality, self-reported poor health and long-term illness, especially for men.³⁶ There is also evidence that education affects health behaviours by reducing smoking³⁷ and obesity, especially for women.³⁸ Overall, education appears to have a weaker effect on mortality, self-reported health and physical activity in Europe than in the US. Speculative explanations include inequality and differences in access to health care and social welfare.

More and better education can also reduce criminal activities by increasing future legitimate work opportunities, which discourages participation in crime, and by affecting the set of people individuals interact with on a daily basis in school, work or their neighbourhoods (i.e. in their environment). Better educated people tend to be more risk averse as they usually face higher opportunity costs of committing crime and incarceration (loss of employment, income, social relationships and social status).

Causal evidence based on European data shows that one additional year of schooling reduces conviction rates for property crimes by 20 to 30% and violent crimes by roughly 30 to 50%.³⁹ The strong positive correlation between low educational attainment levels and large incidence of murder, assault, robbery and property-related crimes has been confirmed empirically in Germany.⁴⁰

In Sweden, increased access to prolonged and more general education for male vocational students has been associated with a persistent reduction in property crime

³⁶ Gathmann, C., Jürges, H. & Reinhold, S., 2015, Compulsory schooling reforms, education and mortality, *Social Science & Medicine*, Vol. 127, No. 1, pp. 74-82; Brunello, G., Fort, M., Schneeweis, N. & Winter Ebmer, R., 2016, The Causal Effect of Education on Health: What is the Role of Health Behaviours?, *Health Economics*, Vol. 25, No. 3pp. 315-27; Kemptner, D., Jürges, H. & Reinhold, S., 2011, Changes in compulsory schooling and the causal effect of education on health: Evidence from Germany. *Journal of Health Economics*, Vol. 30, No.3, pp.340-354. Albouy and Lequien find modest effects of education on mortality in France, see Albouy, V. & Lequien, L., 2009, Does compulsory education lower mortality? *Journal of Health Economics*, Vol. 28, No. 2, pp.155-168.

³⁷ Jürges, H., Reinhold, S. & Salm, M., 2011, Does schooling affect health behaviour? Evidence from educational expansion in Western Germany. *Economics of Education Review*, Vol. 30, No.6, pp. 862-872; Etilé, F. & Jones, A. M. (2011), Schooling and smoking among the baby boomers – An evaluation of the impact of educational expansion in France. *Journal of Health Economics*, Vol. 30, No. 6, pp. 811-831; Galama, T., Lleras Muney, A & van Kipperslius, H., 2018, The Effect of Education on Health and Mortality: A Review of Experimental and Quasi-Experimental Evidence, NBER Working Paper 24225.

³⁸ Brunello, G., Fabbri, D. & Fort, M., 2013, The causal effect of education on body mass: evidence from Europe. *Journal of Labor Economics*, vol. 31. No. 1, pp. 195-223.

³⁹ Machin, S., Marie, O. & Vujic, S., 2011, The Crime Reducing Effect of Education, *Economic Journal*, Vol. 121, issue 552, pp. 463-484; Buonanno, P. & Leonida, L., 2006, Education and Crime: Evidence from Italian Regions, *Applied Economic Letters*. Vol. 13, pp. 709-713.

⁴⁰ Gathmann, C., Jürges, H. & Reinhold, S., 2012, Compulsory Schooling Reforms, Education and Mortality in Twentieth Century Europe, CESifo Working Paper Series 3755, CESifo.

by about 20%.⁴¹ A study based on US data panels finds that one additional year of schooling is associated with (i) an almost 30% reduction in murder and assault cases; (ii) a 20% reduction in motor vehicle thefts; (iii) a 13% reduction in arson; and (iv) an approximate 6% reduction in burglary incidents.⁴² Pupils who have dropped out of high school have twice the incarceration rates of high school graduates. Overall, it is estimated that a 1% increase in high school completion rates of all men (aged 20-60) has the potential to save over \$1 billion annually in public expenditures on US police, the court system and the prison system.⁴³

Education can also increase democratic participation and voting.⁴⁴ In 2015, EU citizens with higher education degrees (ISCED 5-8) were more politically engaged than people with upper-secondary education (ISCED 3-4) and those with less than primary education (ISCED 0-2). The activity rates for these three groups were 20.8%, 11.4% and 5.6% respectively.⁴⁵ In some countries (France, Portugal and the UK), the difference between the activity level of highly educated and less-educated people is even bigger. Correlation, however, does not mean causation. Although there is evidence supporting the view that extra education has a causal effect on political engagement in the US, empirical literature suggests that higher education has a limited causal effect on civic engagement, tolerance and trust in Europe.⁴⁶ While there is abundant evidence that education correlates strongly with social trust and social participation, there is also growing evidence – based on randomised policies focused on social skills training during childhood – suggesting that the relationship is causal.⁴⁷

⁴¹ Åslund, O. et al., 2015, Education and Criminal Behaviour: Insights from an Expansion of Upper Secondary School, Discussion Paper No. 9374. Institute for the Study of Labor (IZA).

⁴² Moretti, E., 2007, Crime and the Costs of Criminal Justice. In Belfield C. & Levin H. (Eds), *The Price We Pay: Economic and Social Consequences of Inadequate Education*, Washington, D.C.: Brookings Institution Press, pp. 142-159.

⁴³ Ibid.

⁴⁴ Democratic participation can be understood as “*participation in activities related to political groups, associations or parties, including attending any of their meetings or signing a petition*” (Eurostat, 2017), and is measured accordingly.

⁴⁵ Golubeva, I., 2018, “The links between education and active citizenship/civic engagement”, NESET II ad hoc question No. 1/2018, Network of Experts working on the Social Dimension of Education and Training.

⁴⁶ Milligan, K., Moretti, E. & Oreopoulos, P., 2004, Does Education Improve Citizenship? Evidence from the United States and the United Kingdom, *Journal of Public Economics*, Vol. 88, No. 9–10, pp. 1667–1695. The authors document the cross-country difference but do not provide an explanation for it. See also Siedler, T., 2010, Schooling and Citizenship in a Young Democracy: Evidence from Postwar Germany, *Scandinavian Journal of Economics*, Vol. 112, No. 2, pp. 315–338; Borgonovi, F., 2010, The Relationship between Education and Civic and Social Engagement, mimeo, OECD, Paris.

⁴⁷ Algan, Y., Beasley, E., Tremblay, R. & Vitaro, F., 2019, The Impact of a Childhood Social Skills and Self-Control Training on Adult Economic Outcomes: evidence from a randomised experiment using administrative data, WP Sciences Po; Huang, van den Brink and Groot, 2009, A meta-analysis of the effects of education on social capital, *The Economics of Education Review*, Vol. 28, No.4, pp.454-64; Osterman, M., 2017, In Education we Trust?, mimeo, Uppsala University.

There is also evidence that higher educational attainment increases the extent of pro-environmental behaviour.⁴⁸ At the macroeconomic level, investing in education improves cognitive and non-cognitive skills, and is one of the main sources of long-term growth (or potential growth).⁴⁹

The macroeconomic models proposed in the literature consider various mechanisms by which education can influence economic growth. The models based on the theory of human capital⁵⁰ view education as an investment in knowledge and skills that leads to increased productivity and higher income. Theories of endogenous growth⁵¹ and technological diffusion view economic growth as dependent on technological change and adoption, and on innovation in products and processes. Endogenous growth theory considers long-term economic growth as driven mainly by factors that are internal to the economy. More specifically, it focuses on the drivers determining opportunities and incentives for technological knowledge creation.⁵² At the heart of the endogenous growth theory lies intellectual capital as the source of technological progress. The accumulation of intellectual capital, in turn, is driven by innovation. Proponents of technological diffusion view the speed of diffusion as being affected by the distribution of skills in the economy. The more dynamic the technology, the more human capital investment is needed.⁵³

Education contributes to human capital formation. It increases both innovative capacity (the ability to generate ideas, create and implement innovations) and technological capacity (the ability to implement and use new technologies), which completely shift the limits of the productive capacity of the economy.⁵⁴ Education increases the potential for

⁴⁸ Meyer, A., 2015, Does Education Improve Pro-environmental Behaviour: Evidence from Europe, *Ecological Economics*, Vol. 116, No. 1, 108-21; Powdhtavee, N., 2020, The causal effect of education on climate literacy and pro-environmental behaviours: evidence from a nationwide natural experiment, IZA discussion paper 13210.

⁴⁹ Hanushek, E. & Woessmann, L., 2012, Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation, *Journal of Economic Growth*, Springer, Vol. 17, No. 4, pp. 267-321; Aghion, P. & Howitt, P., 2006, Joseph Schumpeter Lecture - Appropriate Growth Policy: A Unifying Framework, *Journal of the European Economic Association*, vol. 4, No. 2-3, pp.269-314; Hanushek, E. & Woessmann, L., 2019, The Economic Benefits of Improving Educational Achievement in the European Union. An Update and Extension, EENEE Analytical Report No. 39.

⁵⁰ Mankiw, N., Romer, D. and Weil, D., 1992, A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics*, Vol. 107, No. 2, pp. 154-196.

⁵¹ Lucas, R., 1988, On the Mechanics of Economic Development, *Journal of Monetary Economics*, Vol.22, No. 1, pp. 3-42

⁵² Howitt, P., 2010, Endogenous growth theory. In: Durlauf, S.N. & Blume, L.E. (Eds), *Economic Growth*. The New Palgrave Economics Collection. Palgrave Macmillan, London.

⁵³ Nelson, R. & Phelps, E., 1966, Investment in Humans, Technology Diffusion and Economic Growth, *American Economic Review*, Vol. 56, No. 2, pp.247-283.

⁵⁴ Woessmann, L., 2014, The Economic Case for Education, EENEE Analytical Report No. 20. European Expert Network on Economics of Education.

retraining and career development and the opportunities of the workforce to adapt to changes in the workplace as a result of technological developments and/or changes in the essential characteristics of the professions. Overall, education boosts labour productivity and gives impetus to the innovation required to move the economy.

Since there is a strong relationship between education and earnings (and ultimately productivity), higher levels of education also benefit public finances. This is due to the combined effect of higher tax revenue and social security contributions (owing to increased activity and higher wages) and lower social transfers due to less unemployment. Because people with higher incomes consume more and are more likely to own property, they pay more indirect taxes and property taxes, in addition to income taxes.⁵⁵

The fiscal rate of return to schooling – defined as the discount rate that equates the present value of public expenditure on schooling with the present value of the induced incremental flows of tax revenues and savings on social protection payments – has recently been estimated at 2.9% for a sample of 14 European countries, ranging from -1.7% in Sweden to 6.1% in Ireland.⁵⁶

Some of the returns on education discussed above accrue to society at large rather than to single individuals – including the effects on economic growth, taxes and transfers, reduced crime and improved health (provided that better health reduces public expenditure when health care is publicly provided, as is the case in many European countries). Therefore, the *social* returns on education are likely to be significantly larger than the already sizeable private returns.

3. Education and economic resilience

Economic resilience can be defined as a country's ability to recover quickly after an economic recession. The substantial contraction of real GDP triggered by the economic lockdown in the spring of 2020 raises questions about the speed of the eventual recovery and unemployment costs associated with reduced economic activity. In this section we ask whether a country's economic resilience is associated with the level and quality of (average) education of its population.

⁵⁵ Belfield, C. & Levin, H., 2007, *The Price We Pay: Economic and Social Consequences of Inadequate Education*, Brookings Institution Press, Washington, D.C.

⁵⁶ De la Fuente, A. & Jimeno, J., 2009, The Private and Fiscal Returns to Schooling in the European Union, *Journal of the European Economic Association*, Vol. 7, No. 6, pp.1319-1360. See also Henchen, N. and Sprung-Keysen, B., 2020, A Unified Welfare Analysis of Government Policy, *The Quarterly Journal of Economics*, Vol. 135, No.3, pp. 1309-1318.

We consider the recovery from the 2009 recession, which in many countries produced a significant contraction of real GDP per capita, and define two measures of resilience: short-term resilience (SR), or

$$SR = - \frac{(GDP_{2010} - GDP_{2009})}{(GDP_{2009} - GDP_{2008})} \quad (1)$$

and medium-term resilience (MR), or

$$MR = - \frac{(GDP_{2012} - GDP_{2009})}{(GDP_{2009} - GDP_{2008})} \quad (2)$$

The former measure is the ratio between the change in real GDP per capita between 2009 (the recession year) and 2010 (the year after), and the change in real GDP between 2009 and the year before the recession, which we take to be 2008. This index is equal to 1 when GDP in the year after the recession bounces back to its pre-recession level. It is below 1 when the recovery is less than complete, above 1 when GDP in 2010 overshoots the level before the recession, and negative when GDP in 2010 is below its value in 2009. The latter measure considers resilience three years after the recession, i.e. in 2012.

We measure the average level of education of a country using three indicators: a) the average number of years of education completed by the population (in 2005); b) the average maths test scores attained by 15-year-olds in the 2006 PISA (Programme for International Student Assessment) exercise run by the Organisation for Economic Co-operation and Development (OECD) to ascertain the level and distribution of cognitive skills; and c) educational expenditure as share of GDP in 2005.

By considering these indicators in 2005 or 2006, a few years before the recession, we avoid the obvious concern that educational attainment and expenditure are themselves a function of the level of real GDP per capita. We draw our data from several sources: real GDP per capita is from the World Bank World Development Indicators and is measured in real US dollars (2010 prices); average years of attained education in 2005 are from the Barro and Lee dataset;⁵⁷ average maths scores in 2006 are from the OECD; and education expenditure on GDP is partly from the World Bank and partly from the OECD.

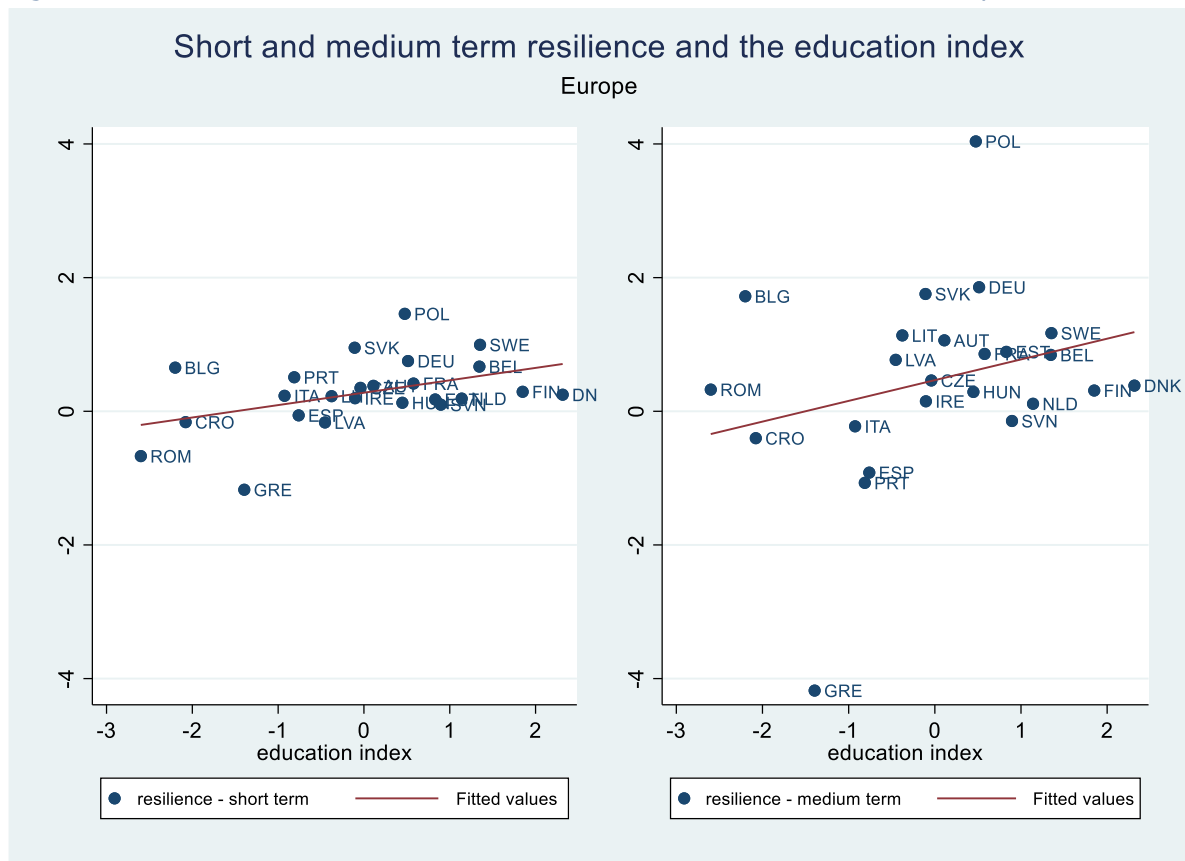
We have data for 24 European countries: EU27 minus Cyprus, Malta and Luxembourg. We combine the three education indicators in a single index by using principal

⁵⁷ See: www.barrolee.com.

component analysis.⁵⁸ The index has zero mean and standard deviation equal to 1.26, close to the difference between its value in Sweden (1.35) and Austria (0.11). It is positively correlated with years of education (correlation: 0.35), average maths test scores (correlation: 0.89) and education expenditure (correlation: 0.83). The index is highest in Finland, Denmark and Sweden, and lowest in Romania, Croatia and Bulgaria.

Figure 8 plots the two measures of resilience against the education index. We notice that both short- and medium-term resilience can be negative, implying that some countries did not recover from the 2009 recession by either 2010 or 2012. Greece is the obvious example. Medium-term resilience is highest in Poland, Bulgaria, Slovakia and Germany.

Figure 8. Association between resilience and the education index in Europe



⁵⁸ Principal component analysis (PCA) is a statistical technique used for data reduction. The leading eigenvectors from the eigen decomposition of the correlation or covariance matrix of the variables describe a series of uncorrelated linear combinations of the variables that contain most of the variance. We use the linear combination associated with the only eigenvalue higher than 1.

The red line shows the fitted regression of resilience on the education index. The slope is clearly positive, suggesting that the two variables are positively associated. Needless to say, association is not causation. In addition, the simple correlation shown in the Figures above may be spuriously driven by a host of country-specific factors affecting both education and resilience. One way to account for these factors would be to consider more than one recession and exploit the variation of education and resilience within countries.

A less ambitious approach consists of regressing resilience on the education index and logging real GDP per capita before the recession (in 2005), with the idea that the last variable controls country-specific effects. When we do so, we obtain the estimates shown in Table 3.

Table 3. Estimated effects of the education index on resilience

	(1)	(2)
VARIABLES	Short-term resilience	Medium-term resilience
Education index	0.253** (0.102)	0.759*** (0.256)
Log GDP per capita 2005	-0.171 (0.158)	-1.137*** (0.398)
Observations	24	24
R-squared	0.161	0.270

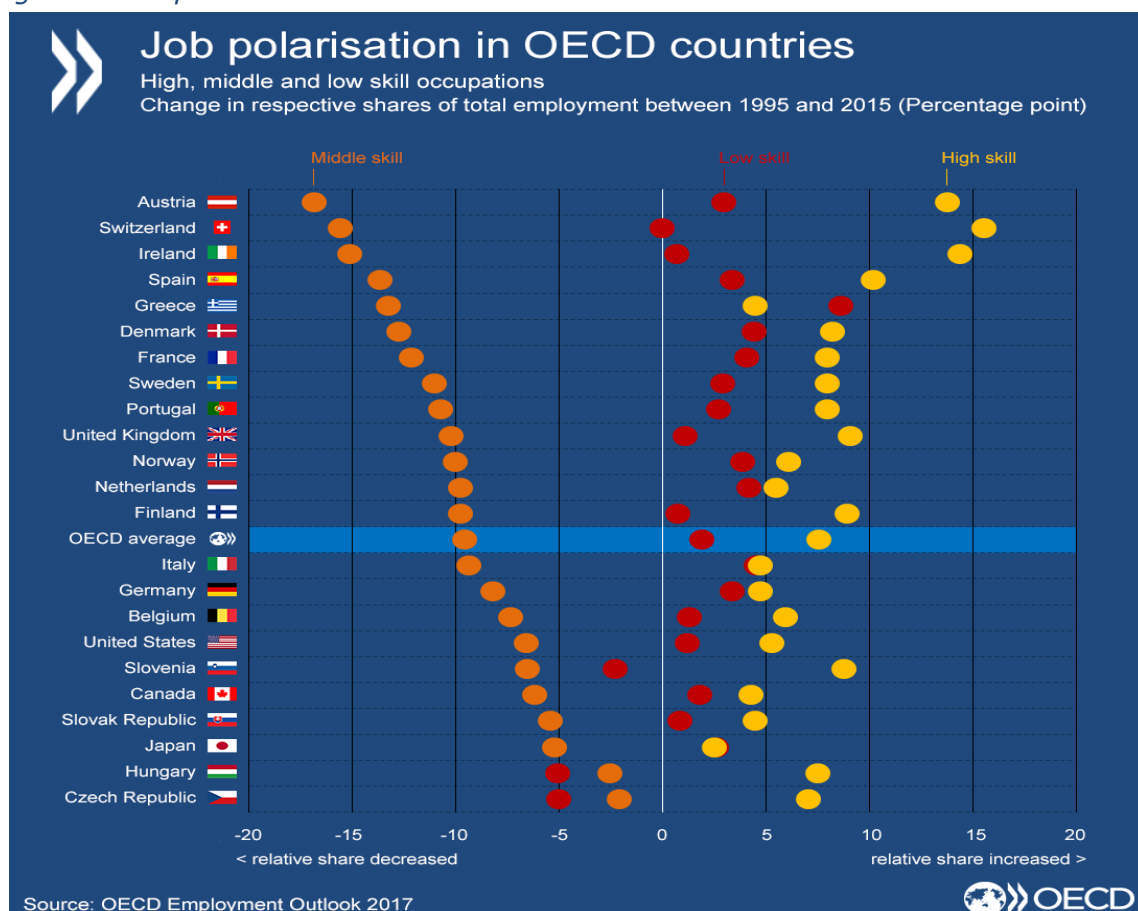
Note: standard errors within parentheses. One, two and three stars for statistical significance at the 10, 5 and 1% level of confidence.

The table indicates that a higher education index increases resilience, suggesting that European countries that are endowed with a higher level of education – in terms of both quantity and quality – also have a higher level of economic resilience, both in the short and medium term.

4. Technological change and digital and green transitions: the shift in demand for skills

Higher qualifications allow workers to deal better with the pressures of labour reallocation induced by technological advances and trade openness on the one hand, and by the decline in low-skilled jobs associated with the dissemination of new technologies on the other. Aghion and Howitt, 2006,⁵⁹ show that in countries that are closer to the technological frontier, a higher share of individuals with tertiary education play a key role in that country's relative momentum and enable it to preserve its competitive advantage. According to the OECD (see Figure 9), between 1995 and 2015, the share of employment held by middle-skill occupations fell by 9.5 percentage points in the OECD area, while the shares of high- and low-skill occupations rose by 7.6 and 1.9 percentage points, respectively.

Figure 9. Job polarisation in OECD countries



⁵⁹ Aghion, P. & Howitt, P. (2006). Joseph Schumpeter Lecture - Appropriate Growth Policy: A Unifying Framework, *Journal of the European Economic Association*, vol. 4, no. 2-3.

The following skills increase the ability to adjust to a rapidly changing world:

- soft skills that robots and AI are not expected to acquire in the short term (for instance, critical thinking, resilience, perseverance or the ability to cooperate).⁶⁰ Unfortunately, the teaching of these skills seems to have been neglected across the EU;⁶¹
- skills in STEM (Science, Technology, Engineering and Mathematics), which contribute positively to innovation but are still lacking in many countries. One out of five young Europeans do not have adequate maths or science skills. This percentage is particularly high in Eastern Europe (see Table 4), probably reflecting the different level of economic development;

Table 4. Percentage of 15-year-olds performing below level 2 on the PISA scale, ranging from 1 (lowest performing) to 6 (highest performing)

	Below level 2 maths	Below level 2 science
Austria	21.1	21.9
Belgium	19.7	20.0
Bulgaria	44.4	46.5
Croatia	31.2	25.4
Cyprus	36.9	39.0
Czech Republic	20.4	18.8
Denmark	14.6	18.7
Estonia	10.2	8.8
Finland	15.0	12.9
France	21.3	20.5
Germany	21.1	19.6
Greece	35.8	31.7
Hungary	25.6	24.1

⁶⁰ Model simulations show that providing access to a functional education and training system is a more effective tool against rising inequality than other policy alternatives such as taxing machines (“robot taxes”). Source: Pfeiffer, P., 2019, “Growth, Inequality, and Redistribution in the Age of Automation”, mimeo. See also Morandini, M.C., Thum Tysen, A. & Vandeplas, A., 2019, Facing the Digital Transformation: are Digital Skills Enough?, European Economy.

⁶¹ Gonzalez Vazquez, I., Milasi, S., Carretero Gomez, S., Napierala, J., Robledo Bottcher, N., Jonkers, K., Goenaga, X. (Eds), Arregui Pabollet, E., Bacigalupo, M., Biagi, F., Cabrera Giraldez, M., Caena, F., Castano Munoz, J., Centeno Mediavilla, C., Edwards, J., Fernandez Macias, E., Gomez Gutierrez, E., Gomez Herrera, E., Inamorato Dos Santos, A., Kampylis, P., Klenert, D., López Cobo, M., Marschinski, R., Pesole, A., Punie, Y., Tolan, S., Torrejon Perez, S., Urzi Brancati, C., Vuorikari, R., 2019, *The changing nature of work and skills in the digital age*, Publication Office of the European Union, Luxembourg.

Ireland	15.7	17.0
Italy	23.8	25.9
Latvia	17.3	18.5
Lithuania	25.6	22.2
Luxembourg	27.2	26.8
Malta	30.2	33.5
Netherlands	15.8	20.0
Poland	14.7	13.8
Portugal	23.3	19.6
Romania	46.6	43.9
Slovak Republic	25.1	29.3
Slovenia	16.4	14.6
Spain	24.7	21.3
Sweden	18.8	19.0
United Kingdom	19.2	17.4
Canada	16.3	13.4
Australia	22.4	18.9
United States	27.1	18.6
Japan	11.5	10.8
Korea	15.0	14.2
Singapore	7.1	9.0
Chinese Taipei	14.0	15.1

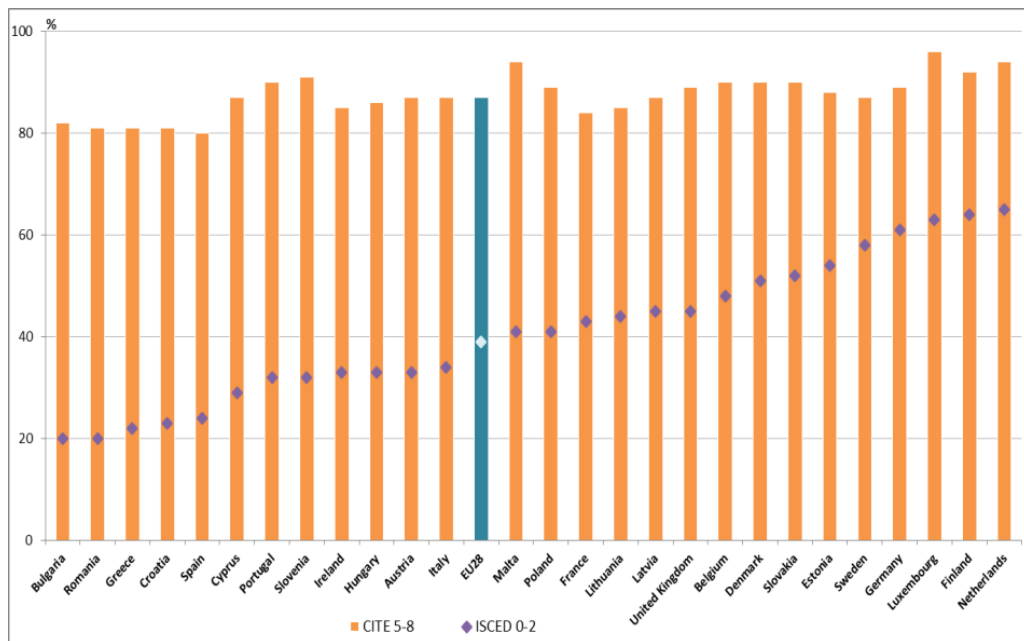
Sources: OECD/PISA 2018.

- digital skills, which play an extremely important role in today's economy and society. As shown by Figures 10 and 11 below, there is a strong correlation between digital skills and the educational level attained. Nevertheless, 44% of the EU population as a whole still has an insufficient level of digital skills,⁶² and improvement has been very slow over the last four years.⁶³

⁶² Estimates based on 2019 data.

⁶³ European Commission, 2019, Investing in people's competences - A cornerstone for growth and wellbeing in the EU.

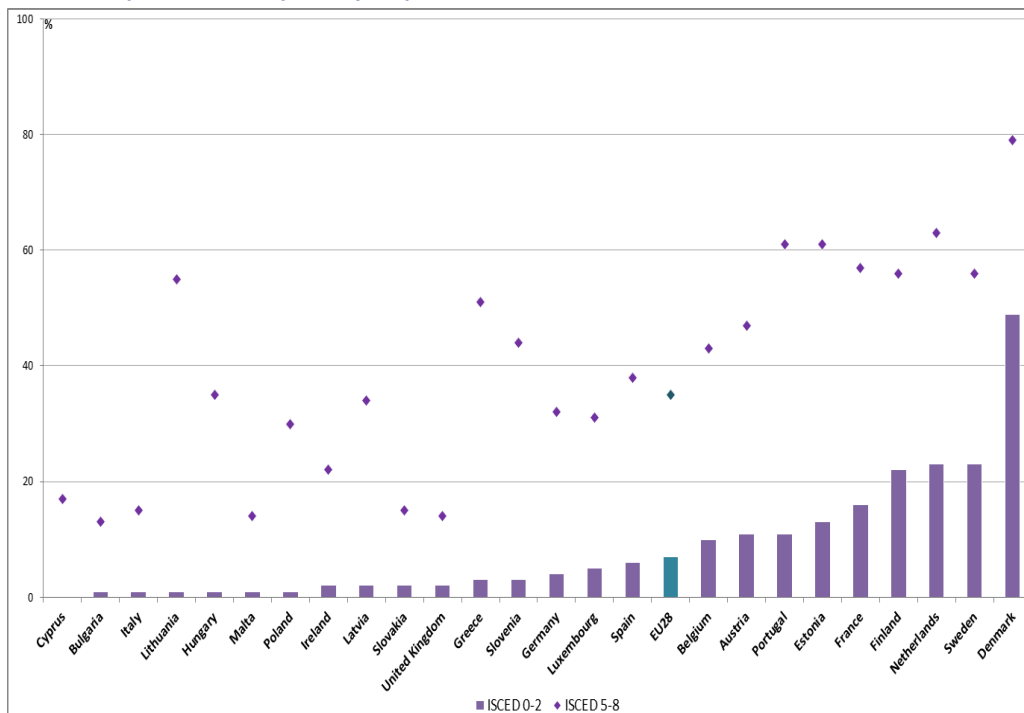
Figure 10. Daily use of a computer by individuals aged 16 or older (2015), by education



Note: ISCED 0-2: below upper secondary education; ISCED 3-4: upper secondary and post-secondary (non-tertiary); above ISCED 4: tertiary.

Source: Eurostat.

Figure 11. Proportion of the population who submitted an income tax declaration using public authority websites (2013), by education



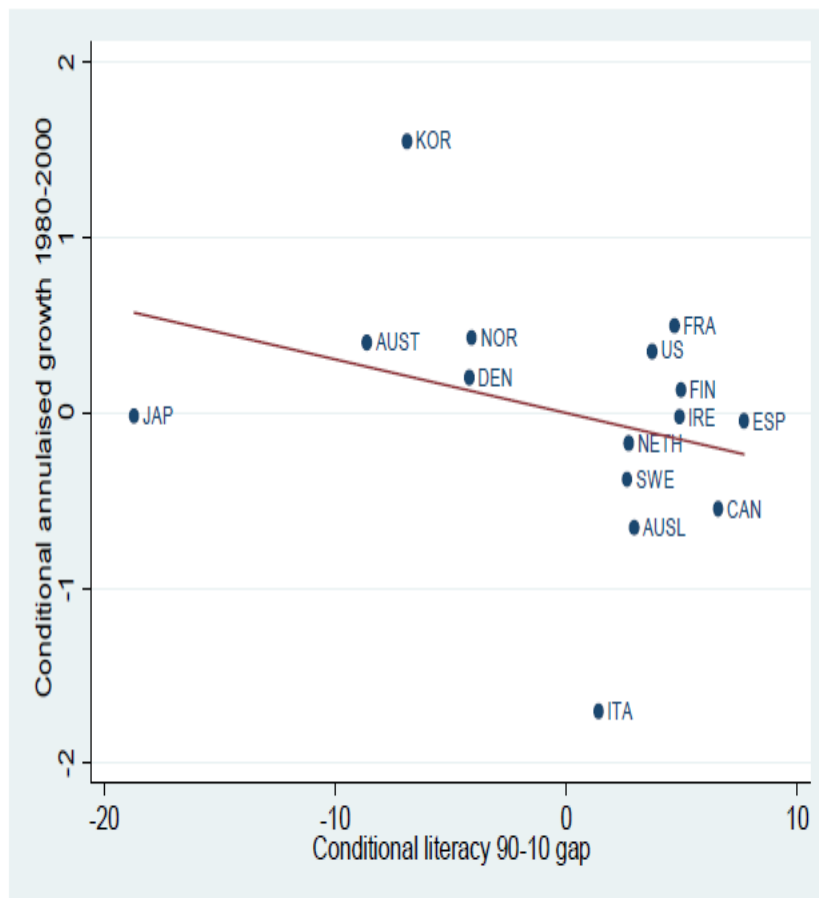
Note: ISCED 0-2: below upper secondary education; ISCED 3-4: upper secondary and post-secondary (non-tertiary); above ISCED 4: tertiary.

Source: Eurostat.

5. Education and inequalities

Empirical studies show that income inequality is closely connected to educational inequality and limits growth. The correlation between the dispersion of literacy in the adult population⁶⁴ measured as the ratio of the 90th to the 10th percentile, and the annual average growth rate of real GDP per capita between 1980 and 2000, is negative (see Figure 12) and close to -0.3 .⁶⁵

Figure 12. Correlation between growth and the distribution of education



Note: Plot of the residual of annualised growth from 1980 to 2000 on the residual of 90-10 ratio of literacy scores in 2013. In both cases, residuals are obtained by regressing the variables on GDP in 1980 and average years of education in 1980 to remove the effect of initial conditions.

Source: Data from the OECD Skills Outlook, 2013, and Hanushek and Woessman, 2010.

⁶⁴ Source: OECD, The Survey on Adult Skills.

⁶⁵ See Blanden, J. & McNally, S., 2015, Reducing Inequality in Education and Skills. Implications for Economic Growth, EENEE Analytical Report No. 21. Castello and Domenech, 2002 - using data across 108 countries between 1960 and 2000 - have shown that inequality in education, as measured by the Gini coefficient in the years of schooling, has a negative relationship with economic growth. See Castello, A and Domenech, R, 2002, Human capital inequality and economic growth: some new evidence, *Economic Journal*, Vol. 112, issue 478, pp.187-200.

Improving access to good-quality care and preschool programmes for children from disadvantaged backgrounds is important. Good-quality affordable early-childhood education and care can be instrumental in giving children the best start in life and reducing early gaps in speaking and other cognitive skills. Preschool attendance can make a large difference in later educational and learning outcomes. Evidence from an expansion of childcare or preschools in several countries (e.g. Norway and France) shows improved learning outcomes, especially among children with low-income parents.⁶⁶

More generally, work led by James Heckman shows that returns on early childhood programmes are highest for children from disadvantaged backgrounds who do not receive substantial amounts of parental investment in the early years.⁶⁷ These programmes have higher benefit-cost ratios and rates of return, as well as improving the cognitive and socioemotional abilities of children and promoting schooling, leading to better jobs.⁶⁸

For example, the evaluation of the Perry Preschool Project, an early intervention programme targeted at disadvantaged young African-Americans revealed a significant increase in their high-school graduation rate, and in their probability of earning at least \$20,000 a year as adults.⁶⁹ Similarly, the “Parler Babin” programme (tested out in sensitive urban areas in France in 2008 with children between 18 and 35 months) showed a net improvement of the verbal skills of the children who had the lowest level of initial skills.⁷⁰

Other measures have been experimented, mainly in the US, to try to overcome the impact of coming from a disadvantaged family. For instance, the “Promise Neighbourhoods” programme is not solely focused on schools, but provides a set of services to sensitive neighbourhoods. These services include, among other things, courses on child development for expecting parents, individualised counselling for university graduates, free legal services, employment workshops and the distribution of meals to every school in the area. The evidence from these programmes is that students

⁶⁶ See OECD, 2018, *A Broken Social Elevator? How to Promote Social Mobility*, Paris.

⁶⁷ Heckman, J.J. 2008, The case for investing in disadvantaged young children. In *Big ideas for children: Investing in our nation's future*, pp. 49-58, Washington D.C.: First Focus.

⁶⁸ Ibid.

⁶⁹ <https://www.educationnext.org/how-family-background-influences-student-achievement/>.

⁷⁰ Zorman M., et al., 2011, « Parler Babin » un programme de prévention du développement précoce du langage, *Approche Neuropsychologique des Apprentissages chez l'Enfant*, n° 112-113. [in French].

attending the schools selected in the programme obtain higher graduation rates than their peers.⁷¹

In the 1960s, the Coleman Report also pointed out the impact of school mapping on inequalities. Indeed, children are currently assigned to a school based on their place of residence, which creates stratifications by family background. A study held in New York between 2002 and 2008 revealed a 9.5% increase in the graduation rate of a group of disadvantaged students, after their parents were allowed to choose schools without regard to their neighbourhood of residence, at no extra cost to the city.⁷²

6. Mitigating the impact of school closures and distance learning during the lockdown

The extensive lockdown of schools and universities during the Covid-19 pandemic in the early months of 2020 favoured the use of distance learning as a tool to maintain the continuity of education, which increased inequalities between advantaged and disadvantaged students. In this sense, the Covid-19 crisis represents a further challenge for European education systems.

Since distance learning is not a perfect substitute for more traditional learning, the lockdown can first be viewed as a reduction in the length of the school year. Some studies have analysed the impact of a shorter school year. For example, existing evidence suggests that shorter teaching time has a negative – albeit small – impact on learning, as measured by standardised PISA test scores.⁷³ In particular, one more hour per week over the school year in the main subjects is expected to increase maths test scores by around 6% of a standard deviation. A three to four hour loss per week in the teaching of maths for 12 weeks due to the lockdown is estimated to have reduced test scores by no more than 10% of a standard deviation.⁷⁴

The exposure of West German students to a shorter school year in 1966-67 because of a school reform that reduced teaching time by close to two thirds increased grade repetition in primary school and led to fewer students attending higher secondary

⁷¹ <https://www.educationnext.org/how-family-background-influences-student-achievement/>.

⁷² Ibid.

⁷³ Lavy, V., 2005, Do Differences in Schools' Instruction Time Explain International Achievement Gaps? Evidence from Developed and Developing Country, *The Economic Journal*, Vol. 125, No. 3, pp.387-412.

⁷⁴ Burgess, S. & Sievertsen, H., 2020, Schools, skills and learning: the impact of Covid-19 on education, VOXeu.

school. However, the short school year had no adverse effect on earnings and employment later in life.⁷⁵

But the lockdown also implied an increased use of distance learning. Although the continuity of education process after the outbreak of Covid-19 has been ensured by the adoption of distance learning across EU countries, a growing body of research suggest that the lockdown is likely to have entailed learning loss and a widening learning gap in EU. A recent estimate of the average effect of Covid-19 on students' learning computed for France, Italy and Germany indicates a weekly learning loss of between 0.82 and 2.3% of a standard deviation, with a greater learning loss among younger students.⁷⁶

Most of what we know on the impact of distance learning focuses on tertiary education. The available evidence broadly shows that distance learning is less efficient than learning in class, although the gap is relatively small.

Experimental US evidence where students of a major research university were randomly assigned to attend the same lectures either live or online shows modest evidence that live-only instruction dominates internet instruction.⁷⁷ Evidence from the University of Geneva shows that students use live streaming technologies only when events make attending class too costly, and that attending lectures via live streaming lowers achievement for low-ability students but increases it for high-ability ones.⁷⁸

As previous examples of disruption of the educational process due to various *force majeure* crises (floods or other natural disasters) demonstrate, countries with closed schools face the challenge of learning loss,⁷⁹ despite the efforts of education systems to offer alternative remote learning. This could have extremely uneven effects across the spectrum of achievement and could lead to a sharp widening of the gap in learning outcomes.

This conclusion is, however, highly dependent on the type of distant classes provided to the students: studies so far have focused on an analysis of the impact of watching a

⁷⁵ Pischke, J., 2007, The Impact of Length of the School Year on Student Performance and Earnings: Evidence From the German Short School Years, *Economic Journal*, vol. 117, issue 523, pp. 1216-1242.

⁷⁶ Di Pietro, G., Biagi, F., Costa, P., Karpiński Z. & Mazza, J. 2020. The likely impact of Covid-19 on education: Reflections based on the existing literature and international datasets, EUR 30275 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-19937-3, doi:10.2760/126686, JRC121071.

⁷⁷ Figlio, D., Rush, M. & Yin, L., 2013, "Is It Live or Is It Internet? Experimental Estimates of the Effects of Online Instruction on Student Learning", *Journal of Labor Economics*, Vol. 31, NO. 4, pp. 763-784.

⁷⁸ Cacault, M.P., Hildebrand, C., Laurent-Lucchetti, J. & Pellizzari, M., 2019, Distance Learning in Higher Education: Evidence from a Randomized Experiment, CEPR Discussion Paper 13666.

⁷⁹ Thamtanajit, K., 2020, The Impacts Of Natural Disaster On Student Achievement: Evidence From Severe Floods in Thailand, *Journal of Developing Areas*, Tennessee State University, College of Business, vol. 54, No. 4, pp. 129-143.

non-interactive live stream, but they could also consider analysing the impact of a different type of course, designed for a remote public.

These results also do not consider the impact of mixed or blended learning.⁸⁰ Although the development of this type of course seems unsuitable for a lockdown, it could be relevant in everyday classes. In a meta-analysis based on 46 studies on online learning undertaken in 1996-2008, the US Department of Education showed that students who followed online courses had slightly better results, on average, than those following entirely face-to-face ones.⁸¹ Results were even more significant when considering blended courses versus face-to-face ones. It should be noted that this study focused only on secondary and tertiary education, and cannot really be generalised for primary education.⁸²

The loss of learning for students is associated with loss of future opportunities, including diminishing economic benefits in terms of future earnings. A recent study by the World Bank examining the impact of Covid-19-induced school closures on learning outcomes suggests substantial disruption in the global level of schooling and learning.⁸³ Globally, the estimated loss of schooling varies between 0.3 and 0.9 years adjusted for quality, implying that effective years of basic schooling declined from 7.9 years to between 7.0 and 7.6 years. Concerning returns to education, the estimated present value of pandemic-induced loss of earnings in Europe and Central Asia is expected to reach between \$10,361 (optimistic scenario) and \$44,394 (pessimistic scenario) over a typical student's lifetime.

Moreover, the impact on lifetime earnings is strongly dependent on a country's income level. Students from high-income countries face the most significant foregone lifetime earnings – between \$12,252 and \$56,732 at present value per student. According to World Bank estimates, the absence of adequate remedial measures immediately after the reopening of schools has the potential to generate learning losses of close to \$10 trillion in present value, which is equivalent to 16% of the investments that governments are making in the basic education of the affected cohorts of students. In the worst-case scenario, high-income countries face economic losses of close to \$8 trillion in present

⁸⁰ Blended learning refers to the use of both distant (online) and face-to-face learning.

⁸¹ This analysis does not study the impact of online courses on inequalities (developed below).

⁸² U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*, Washington, D.C., 2010.

⁸³ Azevedo, J. et.al., 2020. *Simulating the Potential Impacts of Covid-19 School Closures on Schooling and Learning Outcomes: A Set of Global Estimates*. Policy Research working paper no. WPS 9284; Covid-19 (Coronavirus) Washington, D.C.: World Bank Group.

value. The aggregated economic cost of foregone earnings in Europe and Central Asia is estimated to be between \$1.1 trillion and \$5.9 trillion.⁸⁴ These findings have been confirmed by another recent study, which estimates the present value of lifetime earning losses for high-income countries at between 6 and 9% of current year GDP.⁸⁵

The impact of the lockdown is very likely to vary with the socio-economic backgrounds of pupils. An exhaustive French assessment of primary students in 2020 shows that the crisis has greater effects on children from modest families, who usually do not own the required technologies or that simply cannot work in good condition at home, as they live in poor housing for example. In fact, the negative impact of the crisis (confinement) is primarily related to the educational level prior to the confinement, and the educational level is very much related to the social background⁸⁶. Yet, during the 2020 Covid crisis, France is being particularly attentive to support students with difficulties by providing material and pedagogical support.

The same results held in Switzerland when considering higher education.⁸⁷ The effective integration of technologies in the process of remote learning is highly dependent on immediate availability of enabling factors such as access to electronic devices, adequate internet connectivity, availability of online education resources and quality content, digitally competent teachers and students, a favourable home learning environment, supportive parents, etc. Given heterogeneous access to facilities, this type of learning has then increased inequalities between advantaged and disadvantaged students, causing disengagement and increasing dropouts. The same conclusion has been drawn in the US, where the study of real-time data proves that the Covid-19 crisis has caused a 50% decrease in the maths results of disadvantaged students, while the results of advantaged students have remained globally stable.⁸⁸

Close to 7 million students from primary up to secondary education are expected to drop out globally due to the Covid-related shocks in income.⁸⁹ The most educated and

⁸⁴ Ibid.

⁸⁵ Psacharopoulos, G., Collis, V., Patrinos, H., Vegas, E., 2020. Lost Wages: The Covid-19 Cost of School Closures (English). Policy Research working paper; no. WPS 9246; Covid-19 (Coronavirus) Washington, D.C.: World Bank Group.

⁸⁶ MENJS/MESRI-DEPP (2020), Evaluations 2020 : Repères CP, CE1 : premiers résultats, document de travail 2020-E04, November

⁸⁷ Cacault, M.P., Hildebrand, C., Laurent-Lucchetti, J. & Pellizzari, M., 2019. Distance Learning in Higher Education: Evidence from a Randomized Experiment, CEPR Discussion Paper 13666.

⁸⁸ Chetty, R., Friedman, J. N., Hendren, N., & Stepner, M., 2020. How did Covid-19 and stabilization policies affect spending and employment? a new real-time economic tracker based on private sector data, NBER working paper No. 27431.

⁸⁹ Ibid.

wealthiest families will be better able to cope with the challenges posed by the crisis and to sustain their children's learning at home. They are more likely to have computer equipment and connectivity, a space to work, and books and other learning materials at home; they are also more likely to have the knowledge necessary to support their children and teach them academic subjects themselves, as well as to provide emotional and motivational support. They are also more likely to hire virtual private tutors to keep the instruction going.

In non-crisis settings, this pattern is evident during school breaks: children from disadvantaged families show higher rates of summer learning loss during school vacations, perhaps because of differences in time use and support. During the crisis, differential access to remote learning and conditions at home could widen this gap further.

Attachment to schooling may also fall. For some children and youth, being out of school may cause disengagement and reduce their schooling persistence. Children who were already tenuously connected to school could be further discouraged, making them especially vulnerable to dropping out as the economic shock hits. If countries move quickly to support continued learning, they can at least partially mitigate the damage. And with the right planning and policies, they can use this crisis as an opportunity to build more inclusive, efficient and resilient education systems.

Despite these warnings concerning distance learning, it should be noted that morale remained good during this period. A survey conducted in France by the Ministry of Education showed that most teachers, parents and pupils were satisfied by the way that distance learning was organised in the country during the lockdown: for example, eight out of ten parents considered the activities proposed to their children during the March-May 2020 lockdown to be beneficial, and seven out of ten teachers were globally satisfied with their students' learning over the period. The vast majority of middle and high school students stated that they encountered few material or organisational difficulties in carrying out their schoolwork. On the other hand, and as highlighted above, a third of them declared that they lacked the motivation to do it.⁹⁰

⁹⁰ MENJS-DEPP, Health crisis of 2020 and pedagogical continuity: the students have learned satisfactorily, Note d'information n°20.26 (2020). See: <https://www.education.gouv.fr/media/71431/download>.

7. Conclusions

The Covid-19 pandemic has amplified existing challenges to European education systems, mainly related to persistent outcome inequalities. There is a risk that public resources devoted to education are reduced by competing claims on the part of the health and social protection systems.

Yet the evidence reviewed in this paper suggests that governments ought to invest more, not less, in education, also by accessing available EU funding. With the right planning and policies, they can use this crisis as an opportunity to build more inclusive, efficient and resilient education systems. The policy responses to achieve this can be summarised in three overlapping phases: i) Coping, ii) Managing Continuity, and iii) Improving and Accelerating.

In the **Coping** phase, remote learning was deployed creatively in many countries. However, given that countries were, in general, not prepared for such a shock, they are all learning along the way that they must try to use different platforms to allow them to reach as many students as possible (which represents the critical challenge). Without explicit policies to reach more vulnerable households, only rich and educated families will be able to cope with the shock.

During **Managing Continuity**, education systems should try to prevent dangerous reductions in enrolments and try to close the learning gaps that are likely to have expanded during the closures. Funding for special remedial interventions targeting increased retention and improved learning outcomes (especially of low-income students and those at risk of dropping out) is needed both in the short and medium term. Efforts should be geared towards making up for lost time in order to avoid permanent impacts on the human capital of pupils. This will require measures targeted at reversing learning losses, from improved classroom assessment, to focused pedagogies, to system-level support. It will also require substantial resources, and education budgets must be protected at a time when families have less disposable income to support education at home, and while the public system is likely to experience more pressure.

However, this crisis also provides an opportunity to build stronger, resilient and more equitable education systems than before, in the phase of **Improving and Accelerating**. The current large-scale remote learning experience of the education systems across the EU opens the door for the further digitalisation of education, for the expansion of blended learning practices, which are particularly valuable in adult education, and for the development of important educational innovations.

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