



EUROPEAN COMMISSION
DIRECTORATE GENERAL
ECONOMIC AND FINANCIAL AFFAIRS

INVESTMENT IN HUMAN CAPITAL

- Assessing the Efficiency of Public Spending on Education –

Technical note prepared by European Commission staff for the Eurogroup of 6 November 2017

Executive Summary

Human capital is essential for boosting productivity, pivotal for economic growth and also vital with regard to the resilience of economies. A country's human capital is mainly built through the education system, which is mostly funded by public money. Both the relationship with macroeconomic performance and the public finance angle make this topic of particular relevance for Finance Ministers.

In April 2017, the Eurogroup discussed **common investment principles**¹. According to one of the principles, there is a need to ensure high-quality public investment to boost knowledge-intensive and sustainable growth; investing in quality of education is key in reaching this goal.² The current note focuses on investment in human capital and analyses different dimensions of the efficiency of public spending on education in terms of quantity (educational attainment), quality (cognitive skills), and inclusiveness (integration of young people in employment, training or education). Investment in human capital concerns further dimensions not covered in this note.³

Spending on education is a genuine and decisive public investment in the sense that the expected returns are quite high and typically materialize over a long period. This holds both for individuals (private returns) as well as for the society at large, as human capital accumulation is a key driver for economic/productivity growth, innovation activities and also the resilience of an economy in times of crises. Moreover, next to economic returns, education is also an effective remedy to fight poverty and flatten the income distribution, i.e. many education policies are expected to deliver a double-dividend for the society at large.

Educational attainment has increased in Europe although it remains heterogeneous across Member States. However, in terms of quality - building cognitive skills - Europe is just in the midfield rather than a leading world region. For example, PISA scores in mathematics show that Europe is not leading among developed countries. The same is true for scores in sciences and reading. Moreover, in 2016, a significant proportion of young people was not employed, nor in training or education (20% of 25-29 years old in the Euro area), which shows the vulnerability of this category.

¹ European Commission (2017), "Investment in the Euro Area: Common Principles", Note for the Eurogroup, 4 April 2017.

² Eurogroup 195/17 (07/04/2017).

³ The link between education, achieving certain skills and the related impact on the labour market (which can be for instance reinforced by vocational education and training and adult learning) is beyond the scope of this note. It is however fully recognised that public spending on education is pivotal to ultimately achieve an appropriate match of supply and demand in terms of skills.

Education matters as the resilience of the labour force has been lower for low qualified during the crisis in both EA and EU. The low-educated labour force has been systematically more exposed to the risk of unemployment, which has become even more apparent during the crisis period when the unemployment rate among the low-educated has sharply increased. Moreover, whereas the unemployment rate among the medium- and high-educated labour force has more or less returned to pre-crisis levels, this is not the case for the low-educated workers.

Reinforcing human capital formation in Europe is not necessarily about spending more (public) money on education rather than spending it more efficiently. In terms of educational attainment, efficiency of public spending has increased notably over the last 20 years. However, the empirical analysis shows that significant room for improvement remains in many countries in terms of 'quality' and 'inclusion'. It is remarkable that some Member States have managed to achieve high efficiency in all observed dimensions 'quantity', 'quality' and 'inclusion', thus demonstrating that this is feasible and there is not necessarily a trade-off between achieving high scores in all relevant aspects. In some cases, rethinking national education policies (possibly implying structural reform) appears necessary to attain better performance.

How to spend smartly and efficiently on human capital will in any case be country specific. Instrumental in assessing and improving country-specific education policies could be conducting comprehensive sectoral spending reviews on education (proved to be an appropriate instrument to identify and remove inefficiencies and/or achieve savings). Moreover, learning from countries/regions that are seen as appropriate peers – i.e. benchmarking individual solutions against other countries' / regions' best practices – appears to be vital. Closing the gap with the best-performing countries in the EU or euro area should be the ambitious goal.

An important issue for individual resilience concerns adult learning. Digitalisation coupled with rapid technological changes will reinforce the need to learn for adults. The demand for digital technology professionals is growing. Yet, digital skills are found to be lacking in Europe at all levels. It is of particular importance to ensure that the low-skilled are on a fruitful learning path. In this regard, a recent initiative by the European Commission termed "Upskilling pathways: New Opportunities for Adults"⁴ was adopted by the Council on 19 December 2016. This initiative was a deliverable of the "New Skills Agenda for Europe"⁵, a set of ten actions with the aim to make the right training, the right skills and the right support available within the EU.

Questions to Member States:

- Which role and instruments do Finance Ministers see in promoting an efficient education system?
- Which educational output (quantity, quality or inclusiveness) is the most challenging in your country?
- In which area could spending reviews help to promote efficiency?

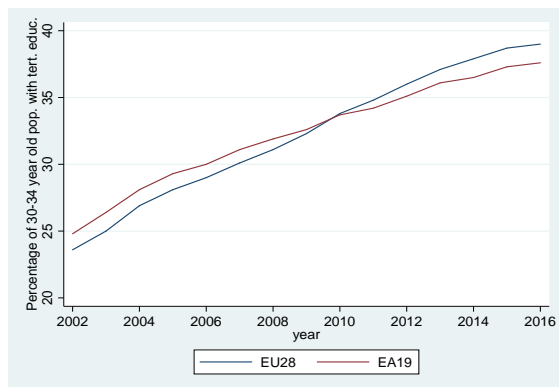
⁴ <http://ec.europa.eu/social/main.jsp?catId=1224>

⁵ <http://ec.europa.eu/social/main.jsp?catId=1223>

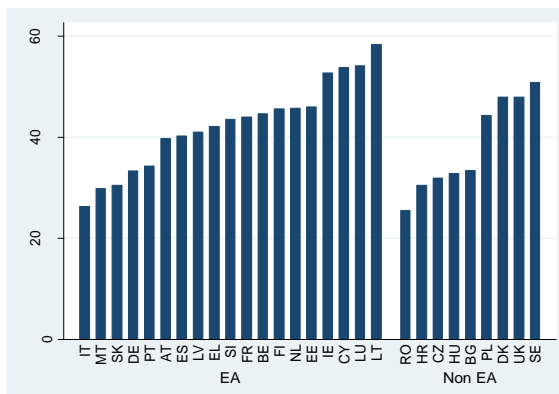
1. WHERE DOES THE EURO AREA STAND IN TERMS OF EDUCATION?

Educational attainment in EA and EU28 has increased over time, but remains fairly heterogeneous across Member States (Graph 1a and 1b). The share of population reaching tertiary education has increased overall. However, there are significant differences across countries, with Luxembourg and Lithuania displaying the highest share of young adults achieving third level education, followed by Cyprus, Ireland and Sweden.

Graph 1a: Evolution of tertiary educational attainment in EU and EA



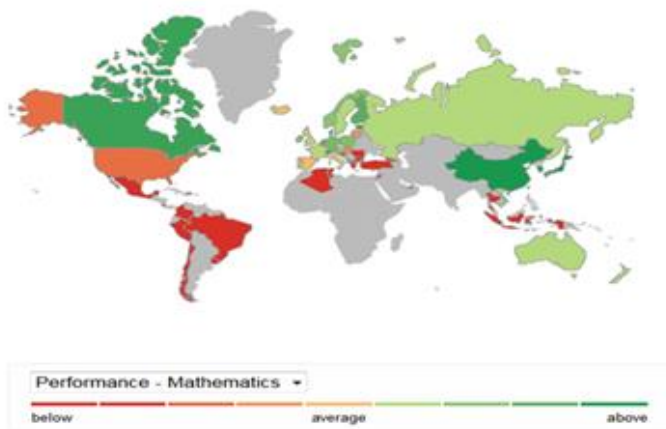
Graph 1b: Tertiary educational attainment in the EU Member States, 2016



The figures refer to population aged 30–34 with tertiary educational attainment (ISCED 5–8).

Source: Eurostat

Graph 2: World map - PISA scores in mathematics, 2015



Source: Source: OECD (2015), <http://www.oecd.org/pisa/>

In terms of quality - building cognitive skills - Europe is just in the midfield rather than a leading world region. PISA measures basic competences which are used in daily life. Indeed, PISA⁶ scores in mathematics show that Europe is not leading among developed countries (Graph 2). The same is true for scores in sciences and reading

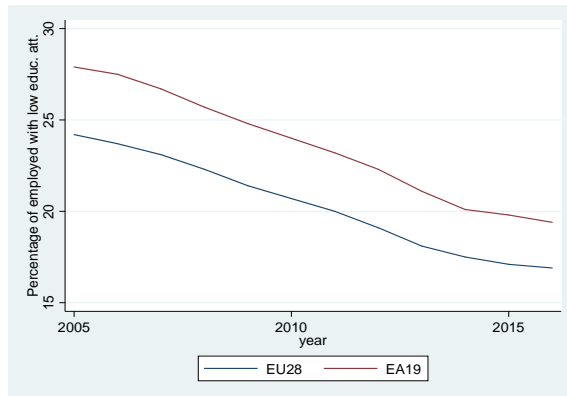
The resilience of the labour force has been lower for low qualified during the crisis in both Euro area and EU. There

is a general trend of qualification upgrading in the labour force (Graph 3a), i.e. the share of low-educated in total employment has decreased over time. The low-educated labour force has been systematically more exposed to the risk of unemployment, which has become even more apparent during the crisis period when the unemployment rate among

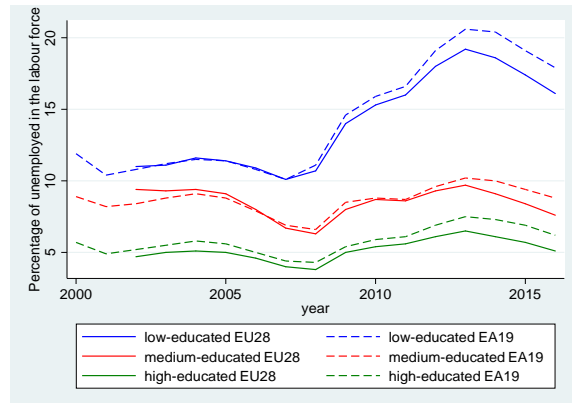
⁶ The Programme for International Student Assessment (PISA) is a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students (source: OECD). Other international surveys are available too, e.g. since 1995: TIMS (Trends in International Mathematics and Science Study).

the low-educated has sharply increased (Graph 3b). Moreover, whereas the unemployment rate among the medium- and high-educated labour force has more or less returned to pre-crisis levels, this is not the case for the low-educated workers.

Graph 3a: Evolution of employment of low educated in EU and EA

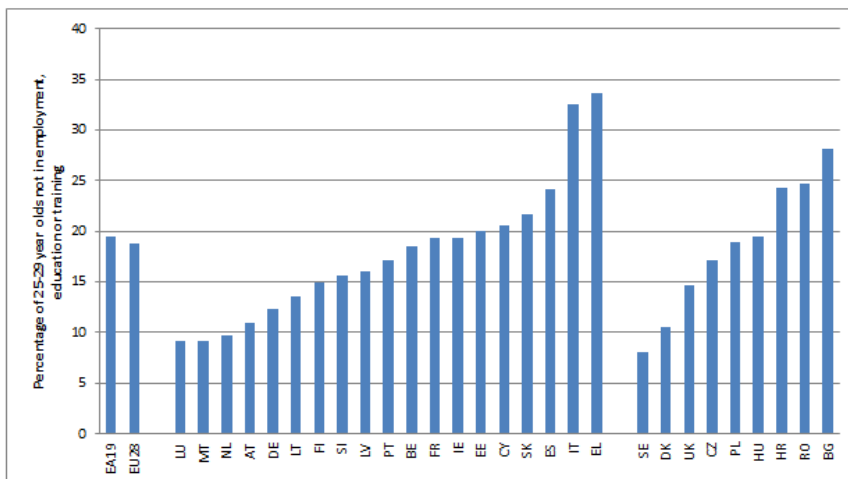


Graph 3b: Evolution of unemployment in EU and EA by educational attainment levels



Source: Eurostat.

Graph 4: Young adults not in employment, education or training in the EU Member States, 2016



The figures refer to population aged 25-29.

Source: Eurostat

In 2016, the share of young people not employed, nor in training or education (NEET) was close to 20% in the Euro area, with Spain, Italy and Greece scoring highest (Greece reaching almost 35%). Overall, Denmark and Sweden display the lowest NEET rates

with values around 10%. Generally, a very heterogeneous situation is observed across Member States, which may have been aggravated in some Member States during the economic and financial crisis.

2. THE ECONOMIC CASE FOR PUBLIC SPENDING ON EDUCATION

In April 2017, the Eurogroup discussed **common investment principles**⁷. According to one of the principles, there is a need to ensure high-quality public investment to boost knowledge-intensive and sustainable growth, and investing in education is key in reaching this goal. A recent ad hoc survey conducted by the ECB⁸ of key euro area businesses on structural reforms in the euro area confirms the importance of high-quality

⁷ European Commission (2017), "Investment in the Euro Area: Common Principles", Note for the Eurogroup, 4 April 2017.

⁸ <https://www.ecb.europa.eu/pub/economic-bulletin/html/eb201706.en.html>

education for the business sector as over 90% of the interviewed businesses strongly supported reforms designed to enhance the quality of education and training.

Education typically pays off, both for the individual and for society at large. At individual level, getting educated and acquiring skills makes people more productive and these productivity gains translate into wage increases (this is referred to as the private return to education). At macro level, a well-educated labour force contributes to economic and productivity growth and advances the innovative capacity of a society which altogether helps increasing the standard of living for the entire population (referred to as the social return to education).

Education is mostly funded by public money: human capital spill-overs drive a wedge between the private and social return to education, possibly leading to underinvestment in education since social returns to investment tend to be higher than private returns. Human capital spill-overs imply that the benefits from education not only accrue to the people making the investment, but also to others, hence the risk of under-investment. This happens for example when people learn from each other in social interactions. Public provision of education or subsidisation of education systems would correct for this market failure.

Public education also aims to provide equal access to education. Parental resources differ and, even faced when banks are willing to offer student loans, children from less advantaged families may be discouraged to go to school⁹. In most countries, primary and secondary education is the responsibility of central or regional government and aims to provide a fair access to all. Private contributions are relatively more important for tertiary education, though this contribution in the EU is still modest (below 50% on average) compared to other countries such as US (64%) and Japan (65%)¹⁰.

Re-distributional aspects provide a further rationale for public intervention. Indeed, EU countries which are spending more on education also tend to have a more equal income distribution. Countries such as Denmark, Sweden, Finland and Belgium feature relatively high spending on education in combination with a relatively equal income distribution.

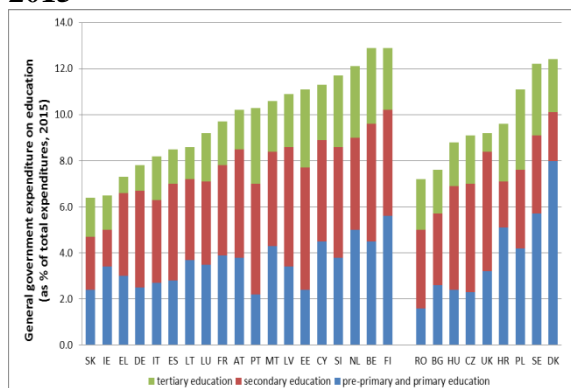
The spending on education has been remarkably stable during the years of crisis, although it makes overall only a rather small share of the total government expenditures (at ca. 10% in Member States). Spending on secondary education is overall the largest spending block, followed by primary and then tertiary education.¹¹

⁹ Poterba, 1994.

¹⁰ OECD.

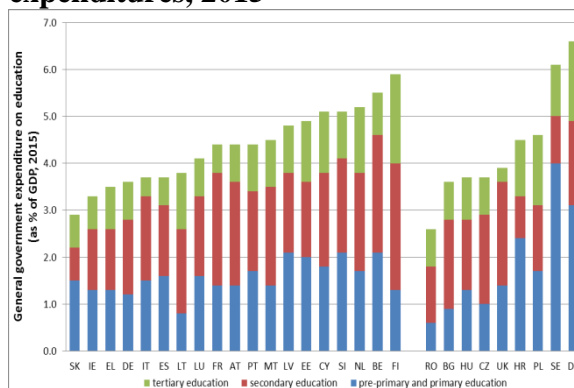
¹¹ Some EU countries – in particular Greece, Romania, Italy, Spain, Ireland, Portugal – experienced temporary declines in educational spending that could be attributed to the crisis. For a discussion of international benchmarks for education spending and the somewhat problematic nature of such figures see e.g. World Bank (2017), pp. 30ff.

Graph 5a: General government expenditure on education, % of GDP, 2015



Source: Eurostat

Graph 5b: General government expenditure on education, % of total expenditures, 2015



3. ASSESSING THE EFFICIENCY OF PUBLIC SPENDING

Public spending on education serves a number of objectives, in particular ensuring a rather highly and adequately skilled population as well as safeguarding fairness and openness across the society. Moreover, human capital accumulation is a key driver for economic/productivity growth, innovation activities and also the resilience of an economy in times of crisis. And, next to economic returns, education is also an effective remedy to fight poverty and flatten the income distribution, i.e. many education policies are expected to deliver a double-dividend for the society at large. These main policy objectives can be grouped into three measurable outputs of (public) spending on education: quantity measured by educational attainment, quality measured by the acquisition of cognitive skills at the end of compulsory school and inclusion measured by the participation of young people in the labour market or education/training system. Hence, in order to assess the overall quality of public spending on education, these three dimensions need to be observed in combination.

The efficiency of public spending is evaluated against a frontier based on EU best performers (where it is assumed that all countries have similar possibilities to generate educational outcomes) and against frontiers based on national education systems (where country-specificities matter).

In terms of educational attainment, efficiency has improved but remains heterogeneous across Member States. Ireland and Lithuania are setting the frontier based on EU best performers in 2015, achieving among the highest tertiary educational attainment rates while spending relatively moderately (graph 6, panel a). It should be noted that the Austrian and the German systems may represent special cases, due to the importance of the dual education system combining apprenticeships and vocational education. However, the degrees typically offered are not classified as tertiary educational attainment and thus this is not captured in the statistics used in this analysis. As regards frontiers based on national education systems, efficiency improvements were tremendous between 2002 and 2015 while spending remained comparably stable (graph 7, panel a). Overall, Member States have considerably improved vis-à-vis their own frontier, in particular Malta or Romania.

However, empirical results suggest potential for progress in relation to improvement of the quality of education, i.e. the level of cognitive skills¹². In this field, efficiency of public spending has declined over time in some Member States. According to the empirical results all countries appear to have room to improve efficiency when compared between them (frontier based on EU best performers), but also to their own frontiers (frontiers based on national education systems). However, a remarkable exception is Portugal, where a significant improvement in efficiency can be observed. Estonia is an interesting example as it is close to its own frontier and the common (EU) frontier.

Finally, in many Member States, results suggest that public spending could improve the integration of young people in society. In this respect, the NEETs indicator - young adults neither in employment nor in education and training - provides a good proxy for assessing integration. Arguably, the vulnerability of young people is not only explained by education, but also by other factors such as the economic situation, the labour market and some other socio-economic characteristics. Sweden is performing relatively well compared to the other Member States.

4. HUMAN CAPITAL IN A CHANGING WORLD: NEW CHALLENGES FOR POLICY

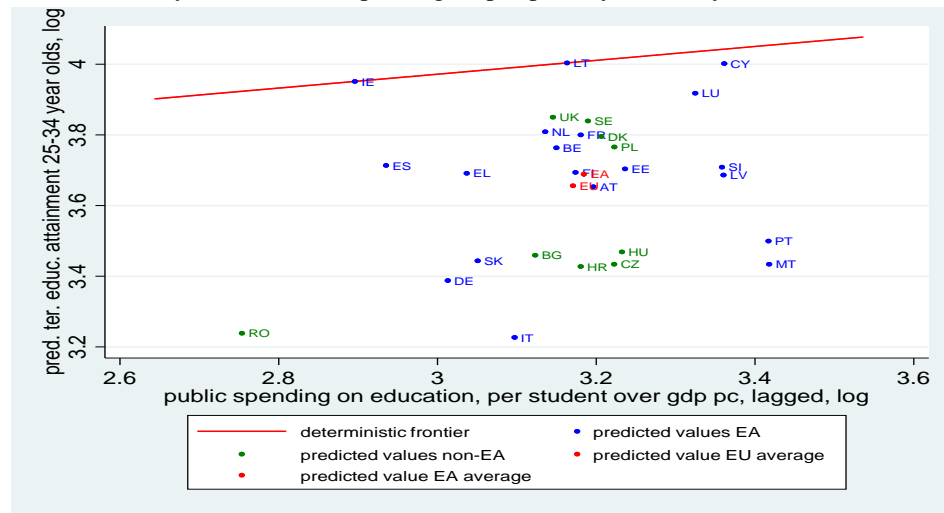
Empirical analyses like the above presented can help figuring out where a country currently stands (1) relative to its own national education systems' possibilities and (2) compared with the EU's best performers. Instrumental in assessing and improving country-specific education policies could be conducting comprehensive sectoral spending reviews on education (proved to be an appropriate instrument to identify and remove inefficiencies and/or achieve savings). Spending reviews on education have been recently conducted or are ongoing in several Member States, i.e. they are completed in Malta and Slovenia and are on-going in Portugal. Policy recommendations could then be derived from on the national level comparing individual solutions and learning about best practices in terms of education policy and the design of the education system in countries that appear to be appropriate peers. Hence, it is important to identify and share best practices. And this could be particularly relevant in case of educational aspects which pose new challenges to Europe's existing education systems in terms of new learning needs and methods triggered, for instance, by societal changes, globalisation, and/or disruptive technological progress (including digitalisation).

An important issue for individual resilience concerns adult learning. This issue has not been included in the analysis so far and would require further analytical work. Technological progress is rapidly changing the characteristics of jobs and consequently the requirements for employees, while the role of knowledge and innovation appears to be ever-growing. Individuals who wish to be competitive in the labour market increasingly need to permanently update their skills or learn new skills, amongst other reasons to remain employable and socially included throughout their (longer) working lives.

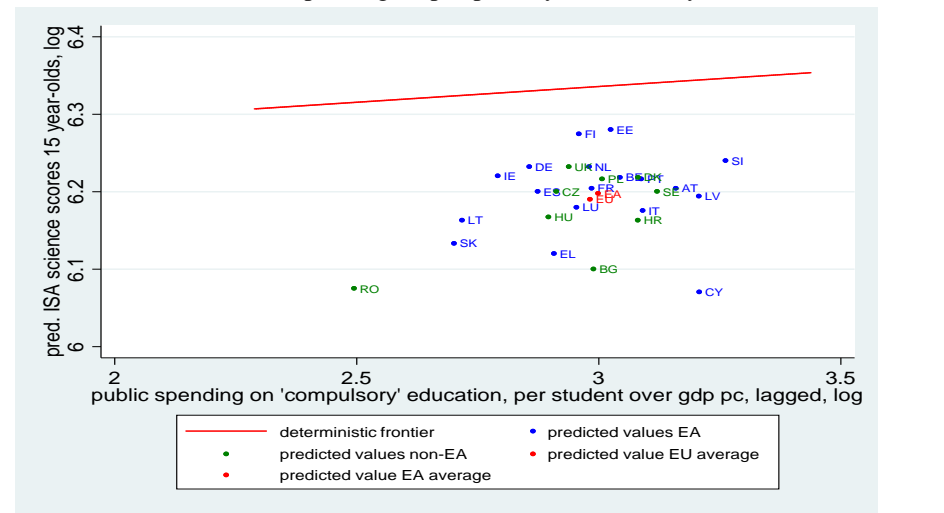
¹² Quality is here defined in terms of PISA scores (Programme for International Student Assessment (PISA) is an OECD project to measure cognitive skills).

Graph 6: Efficiency of public spending on education across countries (frontier based on EU best performers)

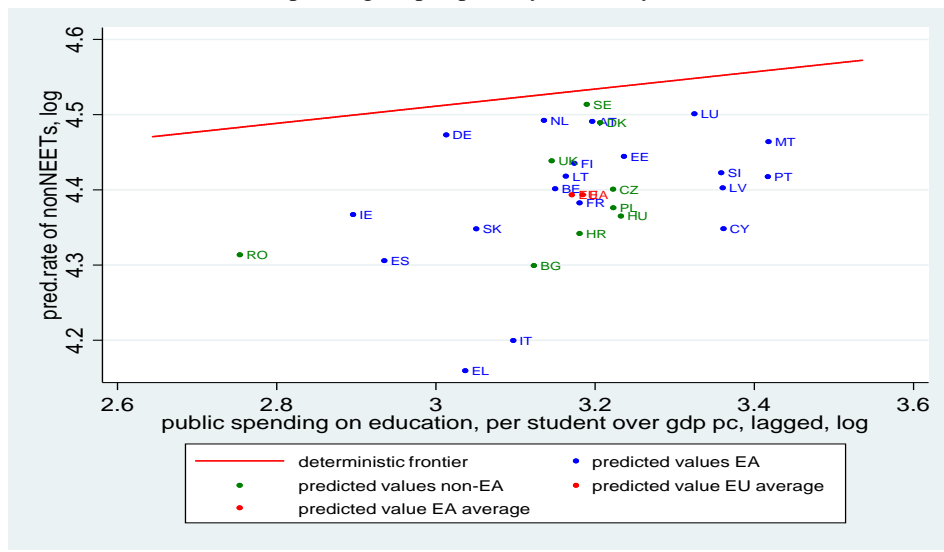
Panel (a) Tertiary education and spending on pre-primary to tertiary education, 2015



Panel (b) PISA scores and spending on pre-primary to secondary education, 2015



Panel (c) NEET rates and spending on pre-primary to tertiary education, 2015



Reading the graphs:

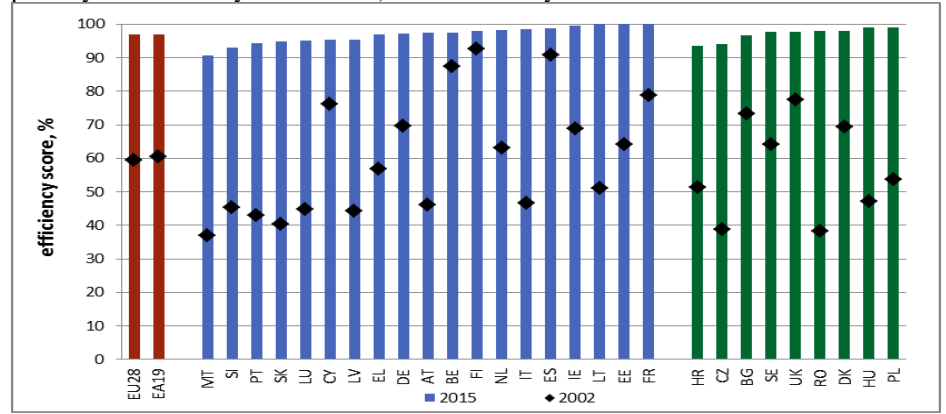
Blue and green dots represent EA and non-EA Member States respectively and red dots represent EU and EA aggregates.

The graphical distance of the depicted observations to the frontier represents inefficiency (to be read as: 'how much more of the corresponding output could be achieved in a country given the same amount of spending on education but avoiding any wastes').

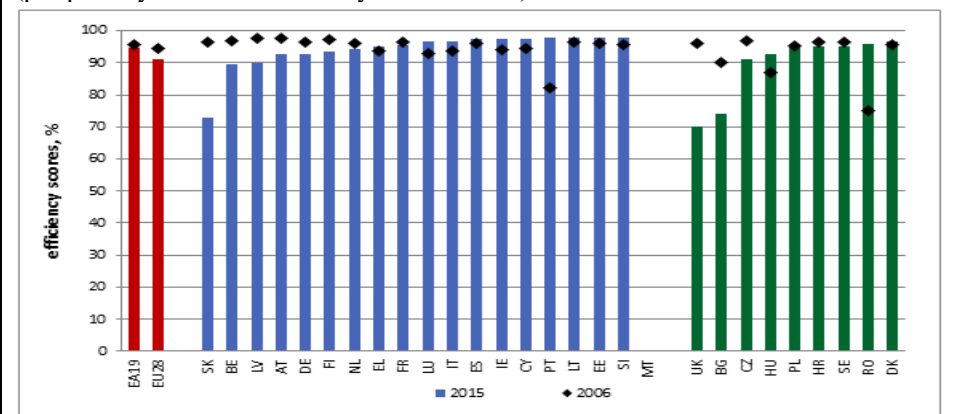
The graphs are constructed under the assumption that all countries have access to a frontier based on EU best performers. The closer a country is, the better it performs. The estimation of the frontier is based on annual data per country (2002 – 2015) and data points represent values in 2015.

Graph 7: Efficiency of public spending on education within Member States (frontiers based on national education systems)

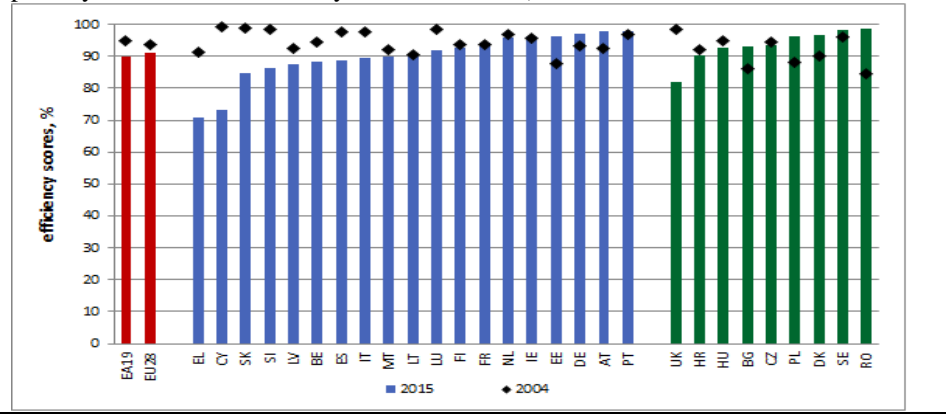
Panel (a) Efficiency scores related to public spending on all education levels (pre-primary to tertiary education) and tertiary educational attainment rates¹³



Panel (b) Efficiency scores related to public spending on compulsory education levels (pre-primary to secondary education) and PISA science scores¹⁴



Panel (c) Efficiency scores related to public spending on all education levels (pre-primary to tertiary education) and NEET rates¹⁵



Reading the graphs:

Efficiency scores of countries reflect the distance to their own frontiers based on national education systems (to be read as: 'how much more of the corresponding output could be achieved in a country given the same amount of spending on education but avoiding any wastes'). The distance to 100% provides an estimate of the potential for improvement.

The graphs are constructed under the assumption that the frontier is country-specific and based on national education systems. Comparison between 2002 and 2015 helps to assess the evolution of a country over time.

¹³ Notes: 2004 data for HR and PL. EU28 and EA averages are unweighted as all indicators involved in the estimation of the efficiency scores are measured per population or per GDP per capita.
¹⁴ Notes: 2006 is used as it gives a higher geographical coverage (23 countries). 2008 values used for LV and RO; 2011 value for Ireland; 2012 value for Cyprus. Data are not available for Malta (PISA science scores). The EU and EA averages are weighted using population weights for 2006 and 2015 as outlined in the data annex in OECD (2012), "Quality Matters in Early Childhood Education and Care" where weights of skills assessment scores for Belgium based on its three different provinces are also based on population figures.
¹⁵ Notes: 2005 and 2009 values for HR and IE. Non-weighted averages for the EU and the EA as all indicators involved in the estimation of the efficiency scores are measured per population or per GDP per capita.

This underscores the policy relevance of adult learning and requires education systems to be adaptive and accessible for anyone seeking for further education (such as university extension).¹⁶

Digitalisation coupled with rapid technological changes will reinforce the need to learn for adults. The growing need for digital skills warrants that education provides highly-relevant content, which would imply permanently updating curricula and possibly adjusting content to fit emerging requirements.

For example, the rapid digital transformation of the economy brought that many jobs now require some level of digital skills (as does participation in society at large). The demand for digital technology professionals has grown by 4% annually in the last ten years.¹⁷ Yet, digital skills are found to be lacking in Europe at all levels.

Box 1: Best practice in terms adult/lifelong learning and digital skills

A major challenge is to effectively deliver learning to low-skilled people. The latter can benefit strongly from training, but are considerably less likely to participate in it. To effectively deliver learning to low-skilled people, it is essential that programmes concentrate first on building up their essential literacy, numeracy and digital skills, providing them with a solid foundation for progression to further learning. For example in *United Kingdom*, the learning offer for migrants from third countries includes opportunities for language training and other preparative courses.¹⁸ Offering flexible learning options is also important to ensure wider participation. In *Denmark*, basic skills training is also provided at company sites, in close cooperation with employers. This considerably improves accessibility: Employees need no transport and can quickly return to their work. Ensuring quality and relevance of skills formation is another key dimension of good adult learning policy. In *Austria*, a nationwide quality label (Ö-Cert) was set up in 2011 for adult education providers. It requires adult education providers to put in place a solid Quality Management System and offers transparency to course participants as well as to authorities (in the context of eligibility for public subsidies).

As a result of progressive digitalization of the economy and of society, digital skills are increasingly becoming required for participation in the labour market and in society. At present, around 70% of jobs in Europe require some level of digital skills,¹⁹ and this is expected to increase. Policymakers have a role to play in digital skills development, for example, by ensuring the integration of digital skills in school curricula²⁰ and making digital skills courses for adults (including elderly) available and easy to access. For example, *Portugal* developed the "INCoDe.2030" public policy initiative which aims at enhancing digital skills around five principles (inclusion, education, qualification, specialisation and research. In 2012, *Estonia* launched "Programme ProgeTiger" to train teachers at preschool, primary and vocational education level to integrate technology education into school curricula.²¹ In the same year, the project "Digital *Poland* of Equal Opportunities" was launched, for which nearly 3000 volunteers were trained and tasked to introduce adults aged 50 and over in their own communities into the digital world. The program is estimated to have reached more than 270,000 learners by the end of 2015.²² Further best practices in the area can be found in other countries: *Ireland* launched

¹⁶ Adult education could be promoted, for instance, by granting tax incentives and/or publicly financing a corresponding voucher system (as applied e.g. in Singapore). See in this regard for instance OECD Note (2017) "School choice and school vouchers: An OECD perspective" (<http://www.oecd.org/edu/School-choice-and-school-vouchers-an-OECD-perspective.pdf>). Further work would however be necessary to assess the effectiveness of these instruments before policy conclusions can be drawn.

¹⁷ COM (2016) "A new skills agenda for Europe"; <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52016DC0381>

¹⁸ COM (2016) 381 final

¹⁹ CEDEFOP's European Skills and Jobs Survey (2014)

²⁰ See e.g. the European Commission's Opening Up Education initiative to promote digital technologies and materials for the improvement of teaching and learning.

²¹ See www.hitsa.ee/it-education/educational-programmes/progetiger

²² See Pokrzywnicka (2015).

several initiatives, in particular the "Digital Strategy for Schools 2015-2020" which aims at increasing ICT infrastructure and use of ICT in teaching, learning and assessment, the "Roadmap for enhancement in a Digital WORLD 2015-2017" which guides institutions and organisations in the development of national and local strategies for harnessing ever-increasing digital capacity and the "Springboard+" initiative providing flexible, free, part-time higher education and training courses with the purpose of up-skilling or cross-skilling; and, finally, the *United Kingdom* launched a number of policy initiatives and programmes related to digital skills and inclusion, as part of the Digital Strategy launched in March 2017 ("Widening Digital Participation" and "Future Digital Inclusion").