ECONOMICS – THEMATIC STUDIES

Investing in **Europe's future**

the role of education and skills

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Investing in Europe's future:

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Investing in Europe's future: the role of education and skills

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Executive summary

Skills are key for Europe's growth, inclusiveness and future prosperity. It is people's skills that underpin an economy's capacity to innovate and adopt innovation successfully. Skills can thus act as a catalyst for growth and economic job creation. Skills are also central to employability and facilitate finding jobs that allow people to realize their potential, contributing to individual well-being and societal cohesion.

Strategies to strengthen human capital development in Europe offer an opportunity to boost Europe's longer-term growth potential and tackle inequalities. The EU is an open and increasingly knowledge-based economy but has been struggling with low productivity growth and a slow recovery of investment. At the same time, Europe is facing the challenge of adapting to demographic trends and rapid technological change. A coherent and forward looking strategy for human capital and skills can help Europe to tackle most of those challenges at once: enhance the innovation capacity of its economy, react to (and potentially lead) the global technological race, leverage on the right pool of skills, avoid lost generations and social losses, while enhancing equality of opportunities, as well as synergies and spill-overs between capital accumulation, productivity and potential growth.

Indications of skill gaps and mismatches in Europe are considerable though. For example, the OECD's assessment of adult skills indicates that about a fifth of Europeans adults struggle with basic literacy and numeracy skills. Many Europeans work in jobs that do not match their talents. At the same time, employer frequently report that firms face difficulties to find people with the right skills. Recent results from the EIB Investment survey suggest that the limited availability of people with the right skills is increasingly viewed as an obstacle: More than seven in ten European firms see it as an impediment to investment. This concern is broadly shared across the EU, among firms of different size and operating in different sectors. Notably, limited availability of skills is seen as a problem by firms in Central Eastern and South-eastern Europe where economies try to catch up with the technology frontier, but is also felt increasingly as a problem in countries close to potential and recovering from the crisis.

With free mobility of workers within Europe, challenges in terms of skills cannot be considered only a local-national challenge. Labour markets as well as education and training systems in member states each face specific challenges. Yet some issues are common across Europe: This includes strengthening the quality and relevance of education and training and ensuring access to it. What role can the EU play given that ideas and people are often mobile but investment in education and skills typically local? What are ways to best support smart investment in human capital in Europe?

On September 25th 2017 the EIB hosted a workshop to debate skill(s) challenge(s) in Europe, their underlying drivers as well as ways to address them, including the role of (EU) policies and financing. One conclusion was that in order to promote skill development in Europe going forward, a better understanding of current gaps and mismatches is needed, together with a thorough assessment of what works and what not when it comes to policy measures. To this end, this compilation brings together several contributions, including micro- and macro perspectives as well as specific country examples, to inform the current European debate. The analyses show that successfully boosting skills requires a comprehensive, well-informed and coordinated strategy involving multiple actors but that mastering skills challenges stand to add substantial benefits in terms of growth and inclusiveness for Europe.

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Introduction

The first two contributions by **Stéphanie Jamet** (OECD) and **Erik Canton, Anna Thum-Thysen, Anneleen Vandenplas and Peter Voigt** (European Commission, DG ECFIN) address three basic questions, i.e. why investing in skills is worthwhile for Europe in general, why at present in particular, and how policy responses need to be designed to increase their prospects of success.

Stéphanie Jamet (OECD) argues that skills are key for countries' successful participation in Global Value Chains (GVC). GVCs come with complex costs and benefits, increasing interconnectedness but also uncertainties, and some of the effects associated with them have prompted recent backlashes against globalization and economic integration. While skill policies are often not at the forefront of this discussion they offer the opportunity to seize the benefits of greater economic interconnectedness and address some of the challenges associated with it. This makes them a crucial element for Europe to maintain and develop (economic) integration – within the EU and the rest of the world – going forward.

Skills are needed to realise productivity gains from GVC participation, to ensure that these transfer to a broad range of firms, and thereby benefit the entire economy. At the same time, they can protect workers against the potential negative impact of GVCs in terms of job losses and inequalities. In addition, skills are crucial for countries to specialise in the most technologically advanced manufacturing industries and in complex business services that are expected to lead to higher productivity and job creation.

Countries can gain comparative advantages through the skills of their population, the quality of their education systems, and alignment with industries' skill requirements. Those with a high share of low-skilled workers will have to make significant efforts with respect to education and training policies if they want to specialise in more technologically advanced activities without unemployment expanding, which also points to challenges for some countries in Europe. The analysis also argues that GVCs raise the demand for cooperation on education and training, e.g. on recognition of qualifications and ensuring quality, thus requiring coordinated policy responses. Finally, focusing on education and training policies in isolation is unlikely to be enough. Strategies to promote skills successfully need to be embedded in a 'whole of government' approach, including labour market, competition and migration policies to fully seize GVCs.

Erik Canton, Anna Thum-Thysen, Anneleen Vandenplas and Peter Voigt (European Commission, DG ECFIN) also point at the potential 'double dividend' from investing in skills and education as a way to promote both efficiency and equity and delivering benefits for

society at large. To that extent, the authors note that investment in human capital is also becoming more prominent in the debate on which structural reforms EU member states should pursue to enhance productivity and ensure that gains are broadly shared. Education and training policies are key levers in this respect.

The authors also point out the link between investment in human capital and intangible capital, which is found to be productivity enhancing. Particularly in view of Europe's shift towards the knowledge and an increasingly digital economy, they emphasize the synergies between the different types of intangible capital as well as human and intangible capital need to be taken into account for policymaking.

Promoting human capital formation in the EU is not necessarily about spending more, though, and the authors point to potential for improvement on the efficiency of public spending on education and the need for benchmarking. In line with the OECD's argument for a 'whole of government' approach to support skills, Canton and al. also note that narrow focus on upskilling is a necessary but not a sufficient condition for success. To this end, the conditions to create jobs to effectively make use of skills also need to be right, i.e. addressing barriers to firm entry and exit, growth and innovation and allowing resources to reallocate.

A look at the micro-level suggests that there remains room for improvement to address these barriers and better promote skill development and deployment in Europe. Notably, findings from the EIB Investment Survey (EIBIS) suggest that firms in Europe are increasingly concerned with limited availability of skills impeding investment. At the same time, corporates also name Higher Education and professional training as a key area for public investment to focus on for the next years.

Patricia Wruuck (EIB) analyses recent EIBIS results, taking a closer look where firms in Europe miss skills in particular and what firms are most concerned. Worries about lack of staff with the right skills are not narrowly confined to particular sectors, regions, or member states but widely shared. Notably, firms are particularly concerned about skills in Central and Eastern and South-eastern Europe.

What is behind the concerns about skills? Firms' perceptions reflect a mix of cyclical and structural factors. We find the issue to be particularly pronounced in places with tight labour markets and Central and Eastern European member states pointing to cyclical conditions as well as labour mobility as potential drivers. EIBIS findings also suggest that exporting and innovating firms tend to miss skills more. In addition, perceptions of skill gaps in Europe may increasingly start to reflect the impact of technological change and digitalization, with firms' demand for skillsets changing faster than supply. While the specific mix of cyclical and structural factors reflected in firms' perceptions varies across member states, the extent to which skills are perceived as an issue across member states point to common European

concerns, suggesting the need for well-designed strategies to mitigate gaps and promote skill development.

The contributions by **Mantas Sekmokas** (European Commission, DG EMPL) and **Konstantinos Pouliakas** (Cedefop, University of Aberdeen and IZA) and **Lidia Salvatore** and **Ernesto Villaba-Garcia** (Cedefop) both take a closer look at two structural issues that can add to firms experiencing skill gaps, i.e. the impact of technological change, or help to mitigate them through Vocational Education and Training.

Digitalization can be one of the drivers of firms' perceived skills gaps, for instance through increasing demand for specific (digital) skills that are (still) in short supply in the market, e.g. programming, or transforming business models, production processes and thus job profiles. It is widely expected that the speed with which jobs are automated is increasing and will continue to do so.

Mantas Sekmokas (European Commission, DG EMPL) and **Konstantinos Pouliakas** (Cedefop, University of Aberdeen and IZA) take a closer look at the implications of automation for labour markets, education systems and research. They note that while the risks of automation to destroy or substantially change jobs are widely discussed, estimates of its impact are subject to considerable uncertainty and sensitive to assumptions. Yet, one common conclusion is that jobs with the highest automation risk are those with more routine nature tasks and that job growth is expected in areas where more advanced cognitive and non-cognitive skills are required. At the same time, occupations' degree of routinisation can also change over time. Evidence about the tasks people perform in different jobs and the extent to which their skill-set fits them remains scant. Hence, one of the implications of automatisation for research is to work towards a better understanding of what tasks people perform in their jobs, what skills are required, and to what extent these have changed over time.

The authors emphasize that the disruption due to technological change poses significant challenges for education and training systems in Europe. Automatisation changes bring adult education systems to the forefront as they can help to prepare people for job transformations and continuously develop those skills that are less likely to be replaced.

Lidia Salvatore and **Ernesto Villaba-Garcia** (Cedefop) present results from the first European public opinion survey on vocational education and training conducted in 2016. While VET is perceived as having a good image and people generally display a positive attitude towards it, particularly for its ability to equip people with the right skills and open up good labour market prospects, the image of VET is less favourable when compared to general education. VET tends to be seen as a second best choice and for second-rate students, and often with limited progression opportunities. The results hint that VET is still confronted with a negative public discourse which tends to reinforce stereotypes and misconceptions. i.e. the

possibility of passing between different educational strands and improving opportunities for continuing vocational education and training throughout working lives could be ways to add to its attractiveness.

One implication of both analyses is that with (faster) technological change and its repercussions on jobs and tasks, education and training systems in Europe also need to adapt (faster). Equipping pupils and workers with the capacity to deal with change, i.e. convey skills like problem solving and 'learning to learn' as well as offering pathways to enhance and upgrade skills throughout working lives are increasingly important in this respect. How well are current education and training systems in Europe geared towards these challenges and what could be practical measures to meet them?

The last two contributions take a closer look at two specific elements of the German education and training system, i.e. dual apprenticeship and a program to incentivize adult education (Bildungspraemie). While many idiosyncrasies in these areas remain across Europe, the country examples add a practical view on what works well in specific member states, or where there remain gaps, potentially informing discussions across the EU.

Lars Thies (Bertelsmann Stiftung) argues that the dual apprenticeship system facilitates transition from school to employment for young people as it is rather successful in conveying skills that employers seek, sufficiently standardized, and provides quality assurance to facilitate mobility of job-seekers within Germany. It allows apprentices to not only gain relevant work experience at a young age but also to develop professional networks and lasting relationships to employers.

While widely viewed as a success in terms of bringing young people in employment, the dual VET system in Germany is not so easy to readily transfer to other countries, as it rests on an institutional structure developed over a long period of time, a history of social partnership and a willingness of employers to train.

Despite its success the German VET system also faces challenges, notably a decreasing participation by employers and applicants and a growing mismatch between open positions and applicants due to geographical factors and developments for specific professions. The author concludes with four recommendations to facilitate implementation of dual VET, i.e. 1. Introducing work-based learning, 2. Convincing businesses to train apprentices by making the business case for dual VET, 3. Involving employers in curricula design and vocational profiles, and 4. Promoting dual study programs to strengthen VET permeability.

Marcus Tamm (RWI and IZA) focuses on ways to incentivize adult education, and especially work-related on the job training and examines the effectiveness of a training voucher program (Bildungspraemie) in Germany. He concludes that the success of the program is rather mixed. It remains difficult to assess how much training was really incentivized by the

voucher and there is a deadweight loss. Also, the author finds that financial constraints which the vouchers can help to mitigate are only relevant for a small share of potential participants and actual participation in training tends to be skewed towards more highly educated workers. On a positive note, participants experience a positive return to the voucher-financed training and notably after the training, they are often engaged in non-routine-task.

The author concludes that voucher programs can be a valuable instrument but need to be carefully designed and better targeted. In addition, he argues that a better involvement of employers in training offers a (more) promising route and can particularly help to foster broader training participation. Also, information deficits about training need to be addressed such as through better (public) counselling.
Many challenges related to skills in Europe today are common, such as improving quality of education and training options and ensuring broad access to them. At the same time, strengthening skill development offers a huge opportunity and value in terms of growth and inclusiveness for Europe at large. Thus, skills also require European reflection.

Each of the contributions in this volume add a dedicated aspect to the ongoing debate about skills. Together, they combine macro- and micro perspectives, as both are needed to inform a coherent and forward looking strategy for skills in Europe. Notably, they emphasize that skill policies need a comprehensive perspective, taking into account linkages with other policy areas, and that there is value in a coordinated approach. Within Europe, benchmarking and exchange of best practices can be valuable tools to inform and improve skill policies. In addition, specific policy measures require careful assessment of what works and what not. Finally, a coherent and forward looking strategy also requires reflection about who should do what for education and skills in Europe, i.e. including public and private actors, and whether resources are sufficient to address challenges going forward.

1. Skills to seize the benefits of global value chains

Stéphanie Jamet, OECD[1]

Key messages:

- *Global value chains present both opportunities and challenges for countries. Their costs and benefits are complex. Investing in skills helps countries to seize the benefits of global value chains.*
- *Cognitive skills, social and emotional skills, and readiness to learn are crucial for performance in global value chains.*
- *Countries need to improve the quality of their education and training systems and work on various fronts to encourage adult education and training.*
- *Countries can cooperate better on the design and funding of education and training programmes and improve recognition of skills acquired informally or abroad. A whole-of-government approach is needed*

Since the 1990s, the world has entered a new phase of globalisation. Information and communication technology, trade liberalisation and lower transport costs have enabled firms and countries to fragment the production process into global value chains (GVCs): many products are now designed in one country and assembled in another country from parts often manufactured in several countries. To seize the benefits of GVCs, countries have to implement well-designed policies that foster the skills their populations need to thrive in this new era.

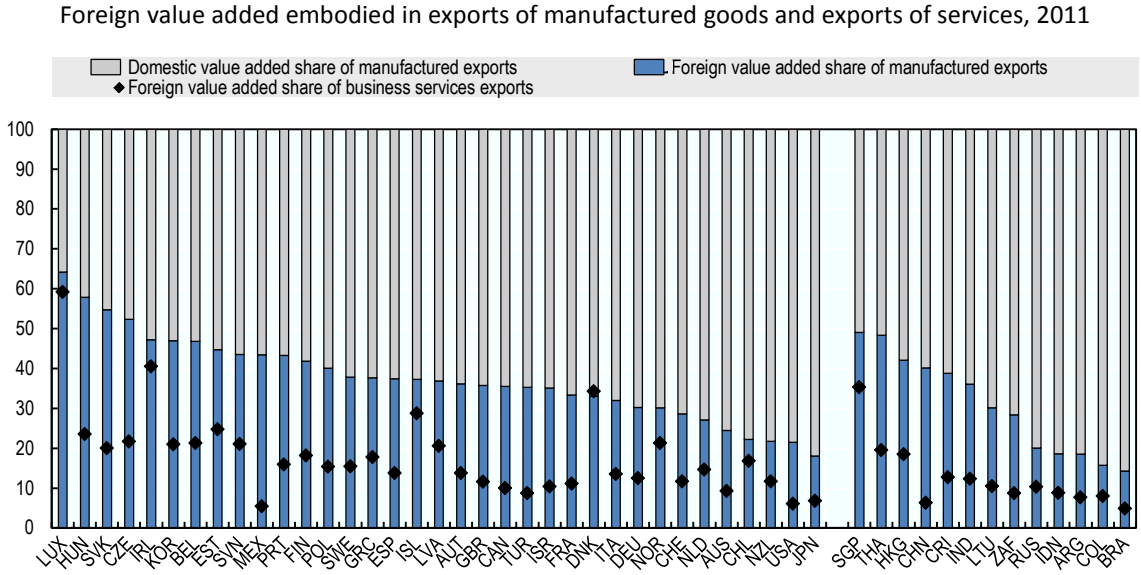
The scale of GVC deployment can be gauged by measuring trade in value-added terms instead of in gross terms, thus distinguishing between the value of exports that is added domestically and the value that is added abroad. Such measurement has been made possible through important recent advances by the OECD in co-operation with the WTO

[1] This contribution is based on the OECD report OECD (2017), OECD Skills Outlook 2017: Skills and Global Value Chains, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264273351-en.

Any additional opinions expressed or arguments employed herein are solely those of the author(s) and do not necessarily reflect the official views of the OECD or its member countries.

(OECD, 2013). On average, in OECD countries, close to 40% of the value of manufactured exports and 20% of the value of business services exports comes from abroad (Figure 1).

Figure 1. The incidence of global value chains



Source: OECD Trade in Value Added database (TiVA), https://stats.oecd.org/index.aspx?queryid=66237.

1.1 Global value chains present both opportunities and challenges for countries

GVCs give workers the opportunity to apply their skills all around the world without moving countries: an idea can be turned into a product more easily and those who are involved in production can all benefit from this idea. GVCs give firms the possibility of entering production processes they might be unable to develop alone. At the same time, the demand for some skills drops as activities are offshored, exposing workers to wage reductions or job losses in the short term. In the long term, however, offshoring enables firms to reorganise and achieve productivity gains that can lead to job creation. Overall, the costs and benefits of GVCs are complex. GVCs increase the interconnections between countries and thereby the uncertainty surrounding the demand for skills. A country's competitiveness can be affected by skills policy changes occurring in its trading partners.

The impacts of GVCs on economies and societies are more diffuse and less controllable than those from the initial phase of globalisation (Baldwin, 2016). Economies used to be split into a sector exposed to international competition and a sheltered sector. Workers could enjoy higher wages in the exposed sector in return for accepting higher risks (e.g. unemployment risks), while governments could design specific policies for this sector. This distinction has now disappeared. Any job in any sector can be the next to benefit or suffer from globalisation: in many OECD countries, up to one-third of jobs in the business sector depend on foreign demand.

The rise of GVCs has prompted a backlash in public opinion in some countries. This negative reaction has sometimes focused on the leading role of multinationals and foreign direct investment. Multinationals can boost production and job creation in the host country by engaging local companies as suppliers, but they can also quickly relocate parts of the production process from country to country. This increases uncertainty about the demand for jobs and skills in each country, while making unco-ordinated policy response in each country less effective. Multinationals are often seen as responsible for offshoring jobs while contributing to the increase in top incomes.

The belief that rising trade integration can lead to unemployment, income losses and inequalities can lead to polarisation of politics (Autor et al., 2016). Given this risk, the challenge for countries is not only to seize the economic and social benefits of GVCs but also to explain their consequences better so that citizens can have informed views on the issue and vote accordingly.

1.2 Investing in skills helps countries to seize the benefits of global value chains

The 2017 edition of the *OECD Skills Outlook* shows that through their skills and well-designed skills policies, countries can shape their capacity to seize the benefits of GVCs. As these policies are also vital to tackle other challenges, such as youth unemployment, investing in skills is a double-dividend strategy. Governments tend to respond to concerns about GVCs with policies outside the skills area, e.g. trade and industry, including policies that aim to stop the offshoring of activities. Such policies can be ineffective and less certain in terms of outcomes, and do not lead to a double dividend.

Skills can help countries to make the most of GVCs through various channels:

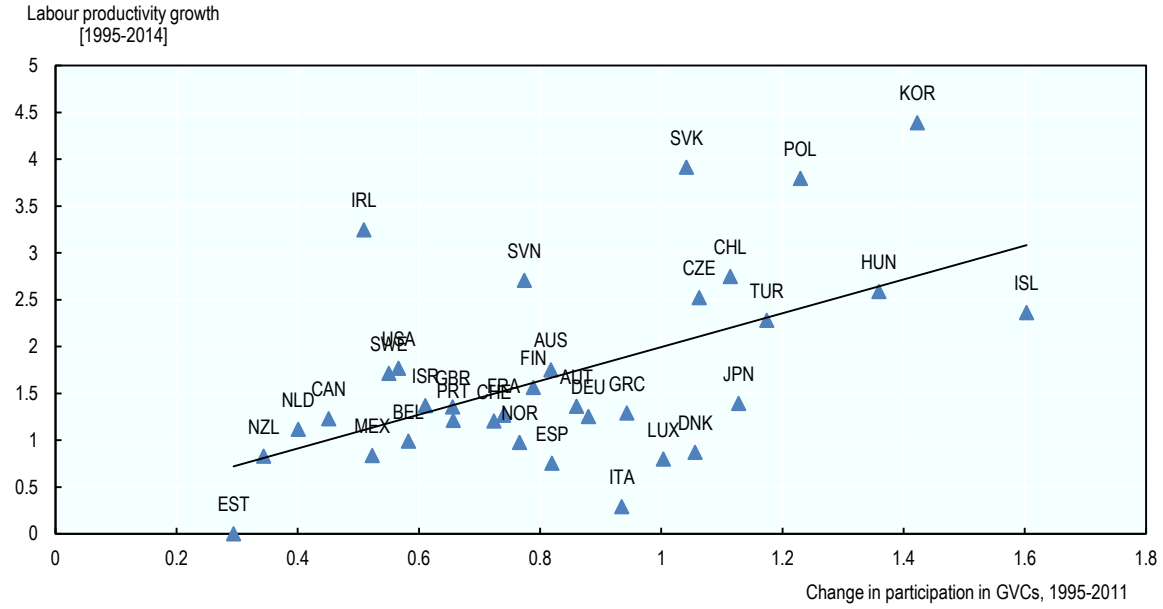
- Skills are needed to realise the productivity gains offered by participation in GVCs and ensure these gains transfer to a broad range of firms, including small ones, and thereby benefit the whole economy. Over the last 15 years, the OECD countries with the highest increases in participation in GVCs experienced average or above-average productivity gains (Figure 2). According to new OECD estimates, countries with the largest increase in participation in GVCs over the period 1995-2011 have benefited from additional annual industry labour productivity growth ranging from 0.8 percentage points in industries that offer the smallest potential for fragmentation of production to 2.2 percentage points in those with the highest potential (OECD, 2017).

- Skills can protect workers against the potential negative impacts of GVCs in terms of job losses and lower job quality. The gap in job strain between low-educated and high-educated workers is larger in countries that participate more in GVCs (Estonia, Hungary, Poland and Slovenia). Investing in skills along with increasing participation in

GVCs is particularly important in developing economies that tend to be at the lower end of value chains, where working conditions are more often poor.

- Skills are crucial for countries to specialise in the most technologically advanced manufacturing industries and in complex business services that are expected to lead to innovation, higher productivity and job creation. A more educated labour force has enabled many OECD countries to specialise in technologically advanced industries, in both the manufacturing and services sectors. However, the comparative advantage that many OECD countries used to derive from the higher education level of their population is shrinking as tertiary education develops in many developing and emerging economies. New OECD estimates show that countries can maintain or gain or comparative advantages in technologically advanced industries through the characteristics of their skills, how well these skills match industry requirements, and their overall capacity to make the most of these skills pools (OECD, 2017).

Figure 2. Labour productivity and participation in global value chains



Source: OECD (2017), OECD Skills Outlook 2017: Skills and Global Value Chains, OECD Publishing, Paris.

More generally, investing in skills can ensure that all individuals understand the challenges and opportunities of globalisation, feel more confident in the future, shape their own careers, and cast informed votes.

1.3 Cognitive skills, social and emotional skills, and readiness to learn are crucial for performance in global value chains

Skills in all their diversity are a fundamental determinant of economic and social success. While there is no broad agreement on a typology of skills, skills that matter for job

performance can be considered as a continuum, with some skills having mostly a cognitive component (e.g. literacy and numeracy), some mostly linked to personality traits (e.g. conscientiousness and emotional stability), and others arising from the interaction and combination of these two components (e.g. communicating, managing and self-organising). The Survey of Adult Skills provides a broad range of information on the skills composition of the population and the tasks performed on the job, which can be used to measure some of the skills that have been identified as important for workers' and firms' performance. This survey directly assesses three domains of cognitive skills (numeracy, literacy and problem solving in technology-rich environments) through administered tests. In addition, the large set of information on frequency of performance of several tasks at work and on attitudes towards learning sheds light on six other skills domains: information and communications technologies (ICT) skills; management and communication skills; self-organisation skills; marketing and accounting skills; science, technology, engineering and mathematics (STEM) skills; and readiness to learn.

Analysis of this information shows that workers' cognitive skills and readiness to learn play a fundamental role in international integration as workers need them to share and assimilate new knowledge, allowing countries to participate and grow in evolving markets. Literacy, numeracy, problem solving in technology-rich environments and readiness to learn all tend to be stronger where exports are stronger, even more so when exports are expressed in value added terms, with cognitive skills having the strongest links.

However, to perform well in an industry, workers need to have the right mix of skills. Strong cognitive skills are not enough on their own to achieve good performance in GVCs and to specialise in technologically advanced industries. Industries involve the performance of several types of tasks, but all require social and emotional skills as well as cognitive skills. To succeed in an internationally competitive environment, countries and industries need skills in addition to those related to their domain of specialisation.

High-tech manufacturing and complex business service industries require all workers to perform at the expected level, because they involve long sequences of tasks and poor performance in any task can greatly reduce the value of output. Pools of workers performing at the expected level (or reliable workers) emerge in countries in which individuals with similar characteristics – including educational attainment – have similar skills. In such cases, employers who have selected applicants on the basis of observable characteristics do not receive any unwelcome surprises from workers' actual skills.

1.4 Countries need to improve the quality of their education and training systems

Countries can gain comparative advantages from their populations' skills, and thereby from the quality of their education systems. They can improve their competitiveness in GVCs by teaching all students strong cognitive and soft skills at the same time, and by developing

multidisciplinarity. This requires innovative teaching strategies and flexibility in the curriculum choice in tertiary education while maintaining a strong focus on developing cognitive skills.

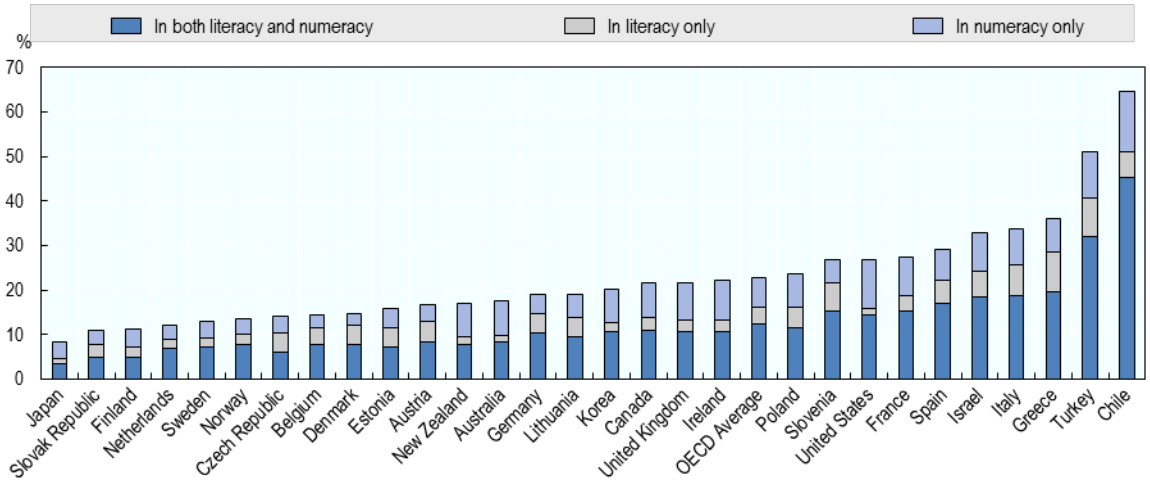
Countries can gain comparative advantages in industries if countries' skills characteristics are closely aligned with industries' skills requirements. To improve this alignment, education and training systems need to co-operate with the private sector, for example through vocational education and training with a strong work-based learning component; local initiatives to link education institutions to the private sector; and policies to foster interaction between the private sector, universities and research institutions. Such co-operation would also make young people feel better prepared and more confident of their capacity to manage their careers in an uncertain environment if they are more exposed to the world of work during their study.

As large parts of global trade are organised around supply chains of multinationals (UNCTAD, 2013), it is important for education and training systems to work with these companies to understand their skills needs. Such links can be developed by encouraging internship and work-based learning, and enabling representatives from firms involved in GVCs to share their experiences with tertiary students. Developing courses in English can also facilitate the recruitment of young graduates by firms involved in GVCs.

1.5 Countries need to work on various fronts to encourage adult education and training

Countries with a low share of low-skilled workers are not necessarily less at risk of offshoring, which depends on a country's position in GVCs: some countries might offshore mainly low-skilled activities while countries higher on the value chain might offshore activities performed by skilled workers. In either case, however, workers find it easier to make the transition to a new job if they have the ability to manage this transition and to learn the necessary new skills. Countries differ in their share of low-skilled adults (Figure 3). Those with a high share of low-skilled workers (Chile, Greece, and Turkey) will have to make significant efforts to implement appropriate education and training policies if they want to specialise in more technologically advanced activities without unemployment expanding.

Figure 3. The proportion of workers with low literacy and/or numeracy skills



Note: Low-performers are defined as those who score at or below Level 1 in in either literacy or numeracy according to the Survey of Adult Skills. Chile, Greece, Israel, New Zealand, Slovenia and Turkey: Year of reference 2015. All other countries: Year of reference 2012. Data for Belgium refer only to Flanders and data for the United Kingdom refer to England and Northern Ireland jointly.

Source: OECD calculations based on the Survey of Adult Skills (PIAAC) (2012 and 2015), www.oecd.org/skills/piaac/publicdataandanalysis.

For workers at risk of displacement, labour market programmes and effective, modern public employment services can ease the transition to new jobs. In the long term, however, policies are needed that prepare workers for a world in which skills requirements are evolving fast, by facilitating the development of skills at various phases of life.

Retraining low-skilled workers is one of the biggest challenges that many countries face. Countries have to find efficient ways to develop skills but also to break the vicious cycle between being low-skilled and not participating in adult learning. In all countries, those who are the most skilled or who are making the most intensive use of their skills are those who benefit the most from adult training programmes.

The obstacles to adult education need to be removed, by better designing the tax system to provide stronger learning incentives, easing access to formal education for adults, improving the recognition of skills acquired after initial education, and working with trade partners to develop on-the-job training opportunities and enhance flexibility in the sharing of time between work and training.

1.6 Countries can co-operate better on the design and funding of education and training programmes…

GVCs benefit from the internationalisation of tertiary education. Students from abroad with a domestic diploma might be well placed, for instance, to work in multinationals and develop activities in their countries of origin. GVCs can also stimulate the

internationalisation of education by giving students opportunities to apply their skills in many countries, not only in the country where they graduated.

Co-operation in the design of education programmes is a way to ensure quality, maintain knowledge in the development of skills that have been offshored but could be brought back to the domestic market tomorrow, and raise the skills in developing economies. Countries could seek agreements to co-design some education and training and consider new financing arrangements that better reflect the distribution of benefits and costs coming from the internationalisation of tertiary education and of the production process. An agreement can take various forms, from consultation on the skills needs implied by offshoring and on how they can be met, to a more formal agreement in which the costs of some education programmes can be shared and offshoring countries can help design education programmes in countries to which activities are offshored.

1.7 … and improve recognition of skills acquired informally or abroad

Improving the recognition of skills acquired abroad would help attract foreign students and foreign workers who can contribute to research, innovation and performance in an international context. And expanding recognition of skills acquired informally would help workers exposed to the risks of offshoring gain further qualifications and adapt to changing needs. In addition, it would give employers clearer signals about workers' actual skills. This can contribute to strong performance in GVCs as workers have to perform at the expected level in order not to weaken the production chain.

1.8 A whole-of-government approach is needed

Within governments, the risks of misalignment between policies and international competitiveness objectives are large. GVCs and trade pertain to ministries with their own sets of policies outside the skills area, while the ministries in charge of most skills policies – education, research and labour – generally focus on national employment and innovation. To make the most of GVCs, a whole-of-government approach is needed.

There are two main types of misalignments of policies. Trade, tax or competition policies aimed at fostering performance in some industries may not be supported by policies ensuring that these industries have the skills they need. Or skills policies may be undermined by employment protection legislation, non-compete clauses or migration policies. For instance, education and training policies may not be able to boost performance in GVCs if migration policies prevent countries from building links with other countries in innovation networks, or if strict employment protection legislation and non-compete clause regulations hinder the needed structural changes.

To make sure that policies across government are aligned in favour of improving performance in GVCs, all of those involved should consult with the aim of reaching a holistic understanding of: i) their country's current positioning in GVCs; ii) the strengths and weaknesses of skills policies, and of other types of policies affecting countries' performance in GVCs; and iii) the potential opportunities for further specialisation. This kind of whole-of-government approach requires moving beyond a short-term policy response to the challenges posed by this new phase of globalisation. In a world that faces major transformations such as globalisation and digitalisation, it is crucial to adopt long-term responses.

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2. Promoting investment in education and skills with a view at enhancing efficiency of public spending and productivity in the EU[1]

Erik Canton, **Anna Thum-Thysen**, **Anneleen Vandeplas** and **Peter Voigt**, DG ECFIN, European Commission

Key messages:

- *Education and skills are prominent on the policy agenda and are taking on a more central role in the structural reform debate. High-quality education is indeed the key to successfully embrace changes that are brought about by technological progress, such as digitalisation.*
- *Reinforcing human capital formation is not necessarily about spending more. Evidence suggests that many EU member states can increase the efficiency of their public spending on education in terms of how this expenditure contributes to raising attainment, improving the quality of education as well as inclusiveness.*
- *In terms of raising productivity growth, upskilling is a necessary but not a sufficient condition. In fact, aside from upskilling, conditions also need to be created for the generation of jobs that effectively make use of these skills and thereby prevent systematic over-qualification and skill-mismatches. Accordingly, emphasis must also be on creating stimulating conditions for firm entry, growth and innovation (which implicitly means allowing reallocation of resources, i.e. also firm exit).*
- *Finally, investment in human capital is strongly associated with intangible capital, which is found to be productivity enhancing. Particularly in view of the 'New' Digital*

[1] The views expressed in the text are the private views of the author and may not, under any circumstances, be interpreted as stating an official position of the European Commission.

Economy[2] and the continuous shift towards the knowledge economy, these synergies should be taken into account in policy making.

Investment in human capital is becoming more prominent in the debate on which structural reforms should be promoted in EU member states. Arguably this increased prominence is spurred by an interest in a new generation of reforms – termed 'Structural Reforms 2.0' by some[3] – going beyond the traditional objective of efficiency by adjoining the complementary objective of equity. It entails flanking pro-growth productivity enhancing measures with policies to ensure that the broadest range of people can benefit from their effects. Education and training policies are key policy levers in this respect – aside quality of public expenditures, open and competitive markets, securiflex in labour markets and fair and efficient tax-benefit systems.

This contribution takes a macroeconomic and public finance perspective when discussing human capital. It takes a look at efficiency and productivity in the context of human capital investment, rather than focussing on specific education policies or on progress towards the Europe 2020 targets. The aim is, in particular, to discuss current on-going work in the Directorate-General for Economic and Financial Affairs both concerning the efficiency of public spending on education and on the link between human capital and productivity[4].

2.1 Efficiency of public spending on education

Spending on education is a genuine and decisive public investment in the sense that the expected returns are quite high and may materialize over a long period. This holds both for individuals (private returns)[5] as well as for the society at large (social returns), as human capital accumulation is a key driver for economic and productivity growth (Lucas 1988[6], Barro 2001[7]), innovation activities and also the resilience of an economy in times of crises.

[2] The 'New' Digital Economy (NDE) can be referred to as "including, most prominently: 1) advanced manufacturing, robotics and factory automation, 2) new sources of data from mobile and ubiquitous internet connectivity, 3) cloud computing, 4) big data analytics, and 5) artificial intelligence." (see " The 'New' Digital Economy and Development', UNCTAD Technical Notes on ICT for Development No. 8, 2017, available at http://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d08_en.pdf)

[3] http://europa.eu/rapid/press-release_SPEECH-16-2124_fr.htm

[4] On-going work in the Directorate-General for Economic and Financial Affairs includes three areas: (1) the efficiency of public spending on human capital, (2) skills mismatch and productivity, and (3) intangible capital and productivity. A note on efficiency of public spending on human capital prepared for the Eurogroup of 06/11/2017 is available at http://www.consilium.europa.eu/media/31409/investment-in-human-capital_eurogroup_31102017_ares.pdf. Regarding intangible capital and productivity, a working paper has been published (Thum-Thysen, A., P. Voigt, B. Bilbao-Osorio, C. Maier and D. Ognyanova (2017): "Unlocking investment in intangible assets", European Economy – Discussion Papers No. 047).

[5] See for instance Psacharopoulos, G., and Patrinos, H. A. (2004). Returns to investment in education: a further update. *Education economics*, *12*(2), 111-134.

[6] Lucas, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, *22*(1), 3-42.

[7] Barro, R. J. (2001). Human capital and growth. *The American Economic Review*, *91*(2), 12-17.

Moreover, next to economic returns, education is also an effective remedy to fight poverty and unemployment, and it helps flattening the income distribution[8], i.e. many education policies are expected to deliver a double-dividend (in terms of equity and efficiency) for the society at large.

Education matters in view of employment patterns and 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.

We recall that from a text-book point of view, the rationale for public intervention in terms of human capital formation, education and skills is to correct for market imperfections (see for instance Poterba 2009[9]). Two forms of market imperfections have been emphasised in the economics of education literature: human capital spill-overs (which are generally associated with knowledge production and human capital accumulation) and capital market imperfections.

Human capital spill-overs imply that benefits from education accrue not only to the people making the investment, but also to others. Hence, human capital spill-overs drive a wedge between the private and social return to education, possibly leading to under-investment in education since individuals making the investment cannot appropriate the full returns. Public intervention can address this market failure by public provision of education and/or by subsidizing education systems or parts of it (mostly in the form of direct financing of education institutes).

Students have difficulties to finance their education on the private capital market due to capital market imperfections. Educational investments can be costly and financing such expenditures through the private capital market tends to be difficult mainly because of information asymmetries (it is costly for banks to observe a student's talent and effort) while human capital cannot be collateralised. Moreover, capital market imperfections tend to create unequal access to education, thus limiting vertical social mobility (e.g. children from economically disadvantaged families would face difficulties to enter higher education). The standard remedy to cope with these capital market imperfections is the provision of publicly backed student loans. Often such loan schemes also have a subsidy element as loans are typically provided under rather attractive conditions (e.g. interest rates below market rates).

[8] See for instance CEDEFOP (2017): "Investing in skills pays off: The economic and social cost of low-skilled adults in the EU".

[9] Poterba, J. M. (1996). Government intervention in the markets for education and health care: how and why? In *Individual and social responsibility: Child care, education, medical care, and long-term care in America* (pp. 277-308). University of Chicago Press.

Our on-going work includes an efficiency analysis, which suggests - building forth on earlier work by Commission Services on the efficiency of spending on tertiary education (cf. St. Aubyn et al. 2009[10]) - that reinforcing human capital formation in Europe is not necessarily about spending more (public) money on education rather than spending it more efficiently. In fact, the evidence shows that in terms of educational attainment, efficiency of public spending has increased notably over the last 20 years. However, significant room for improvement remains in many countries in terms of 'quality' and 'inclusion'. This confirms findings by Grigoli and Ley (2012)[11] who suggest that there is significant room for improving the general use of public resources across advanced economies, inter alia also with a view at spending on education.
How to spend smartly and efficiently on human capital will in any case be country specific. Instrumental in assessing and improving the country-specific policy mix could be conducting comprehensive sectoral spending reviews on education. Moreover, learning from countries or regions that are seen as appropriate peers – i.e. benchmarking solutions against other countries' or regions' best practices – appears to be vital. Closing the gap with the best-performing countries should be the ambitious goal.

2.2 Human capital and productivity

In terms human capital and productivity, we have taken a closer look at the relation between skills mismatch and productivity on the one hand and at intangible capital and productivity on the other hand.

Various dimensions of skills mismatch are considered, including macro-economic skills mismatch (a measure commonly referred to in analyses of Beveridge curve shifts) and on-the-job mismatches (such as over- and under-qualification).

Macro-economic skills mismatch, measured as the dispersion of employment rates across skill groups, is relatively high but decreasing in Member States who joined in 2004 and after, while in the EU-15 the macro-economic mismatch is somewhat increasing (but still relatively low). In the EU28 under-qualification is more widespread than over-qualification, but the former is decreasing while the latter is on a rising trend. These skills mismatches could have repercussions for productivity developments.

Although causal links are hard to establish based on the available cross-country comparable data, one finding that emerges from our on-going work is that episodes of productivity

[10] Aubyn, M. S., Garcia, F., & Pais, J. (2009). *Study on the efficiency and effectiveness of public spending on tertiary education* (No. 390). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.
[11] Grigoli, F., Ley, E., (2012), "Quality of Government and Living Standards," *World Bank Other Operational Studies 17093*, The World Bank.

growth and economic expansion are often associated with declining macro-economic skills mismatch and increasing skills shortages. Furthermore, upskilling is a necessary but not a sufficient condition for raising productivity levels. The positive correlation between tertiary attainment and labour productivity is particularly strong for those countries where upskilling has been associated with occupational upgrading. This implies that efforts to raise attainment should be accompanied by adequate conditions for the creation of jobs that effectively use these skills (and prevent over-qualification). This relates to creating good conditions for firm entry, growth and innovation.

Finally, investment in human capital is strongly associated with intangible capital, which is found to be productivity enhancing. Whether human capital is a component of intangible capital or whether there are simply synergies between these two forms of capital is still debated. While Corrado, Hulten and Sichel (2005)[12] provide a widely used definition of intangible capital which includes employer-provided training (and organizational capital), Hamilton (2006)[13] argues human capital as such is part of intangible capital. Either way, particularly in view of the 'New' Digital Economy and the shift towards the knowledge economy, synergies across the different types of intangible capital as well as between human and intangible capital should be taken into account in policy making (Thum-Thysen, Voigt, Bilbao-Osorio, Maier and Ognyanova, 2017[14]).

[12] Corrado, C., Hulten, C., & Sichel, D. (2005). Measuring capital and technology: an expanded framework. In *Measuring capital in the new economy* (pp. 11-46). University of Chicago Press.
[13] Hamilton, K. (2006). *Where is the wealth of nations?: measuring capital for the 21st century*. World Bank Publications.
[14] Thum-Thysen, A., P. Voigt, B. Bilbao-Osorio, C. Maier and D. Ognyanova (2017): "Unlocking investment in intangible assets", European Economy – Discussion Papers No. 047).

3. Understanding skill gaps in Europe: First Insights from the EIB Investment Survey

Patricia Wruuck, European Investment Bank

Key messages

- *Results of the EIB Investment Survey 2017 suggest that lack of staff with the right skills is a key impediment for firms' across the EU. About 72% companies find it to be an obstacle to investment. At the same time, firms name Higher Education and professional training as one of the key areas for public investment to prioritise.*
- *Concerns about 'Lack of staff with the right skills' are not narrowly confined to particular sectors, regions, or member states but rather prevalent. In places with tight labour markets and in Central and Eastern Europe, they are particularly pronounced.*
- *Corporates that are innovating and exporting miss skills more. Similarly, those who plan to step up investment activity find it to be more of an obstacle.*
- *Firms' perceptions about the lack of skills being an obstacle reflect a mix of cyclical and structural factors. Also, technological change may lead to changing skill demand of firms with skill supply adapting more slowly.*

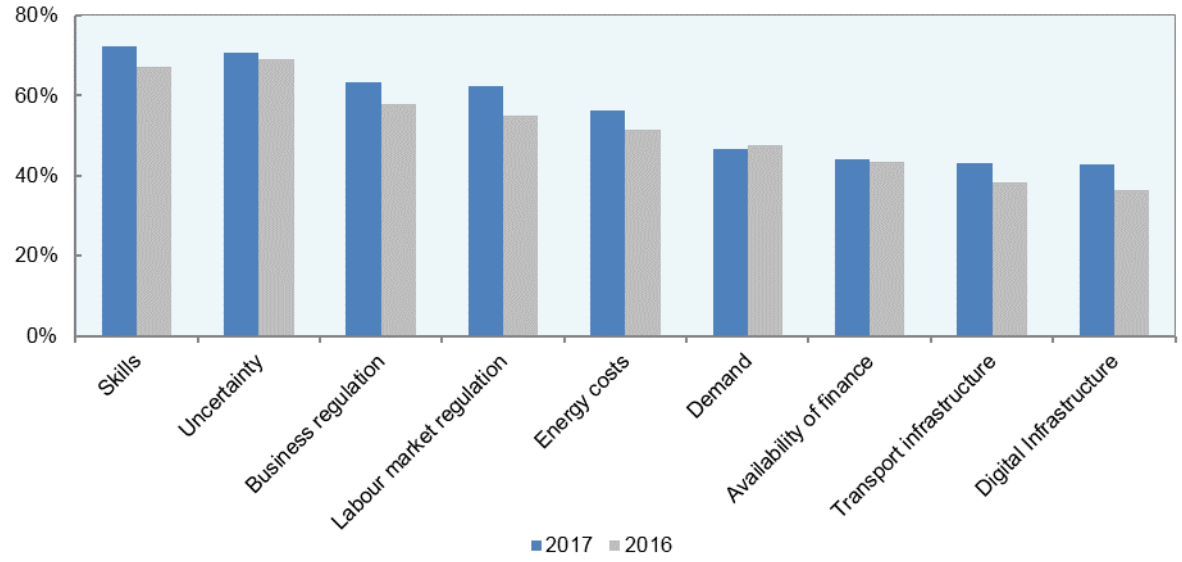
3.1 European firms find limited availability of skills to be key investment impediment

The annual EIB Group Survey on Investment and Investment Finance (EIBIS) aims to better understand companies' investment activities, financing needs and the factors that hold back investment. EIBIS is based on interviews with about 12,500 large and small firms across in all EU 28 member states.[1] The survey includes companies active in manufacturing, construction, infrastructure and the service sector.

[1] Small businesses with starting from min. 5 to 250 employees and larger corporations with more than 250 employees. For more information on the survey see http://www.eib.org/about/economic-research/surveys-

EIBIS results from 2017 underscore that skills are an issue for firms across Europe. Limited availability of people with the right skills is the most frequently cited impediment to investment by corporates. Altogether, 72% consider it to have been an obstacle to their investment activity in the previous year, with some 40% considering it to have been a major issue.[2] Compared to results of the first EIBIS wave (2016), firms' concerns about skills have increased in all but two EU member states.[3] By country, it is the most frequently cited major impediment to investment in 22 member states. Limited availability of skills now tops the list of corporate concerns, replacing uncertainty as the most frequently named obstacle to investment (Figures 1 and 2).

Figure 1. Impediments to investment in comparison (EU average)



Base: *All firms. Q. Thinking about your investment activity in […], to what extent is lack of staff with the right skills a major obstacle, minor obstacle or not an obstacle?* Bars combine shares for 'major' and 'minor' response options.

Corporates' growing concern about the availability of skills reflect a mix of cyclical and structural factors.[4] While the strengthening recovery works to reduce worries about some other impediments, such as demand, concerns about skills have a pro-cyclical component. Higher capacity utilization and tightening labour markets in a number of countries add to skills becoming more pressing, as firms face difficulties to find and hire people with the right qualifications in the short-term. At the same time, the prevalence of 'skills' being perceived as an issue also suggests structural elements reflected in firms' responses. This could point

data/about-eibis.htm and for further analysis based on EIBIS data also see EIB Investment Report 2016 and 2017.

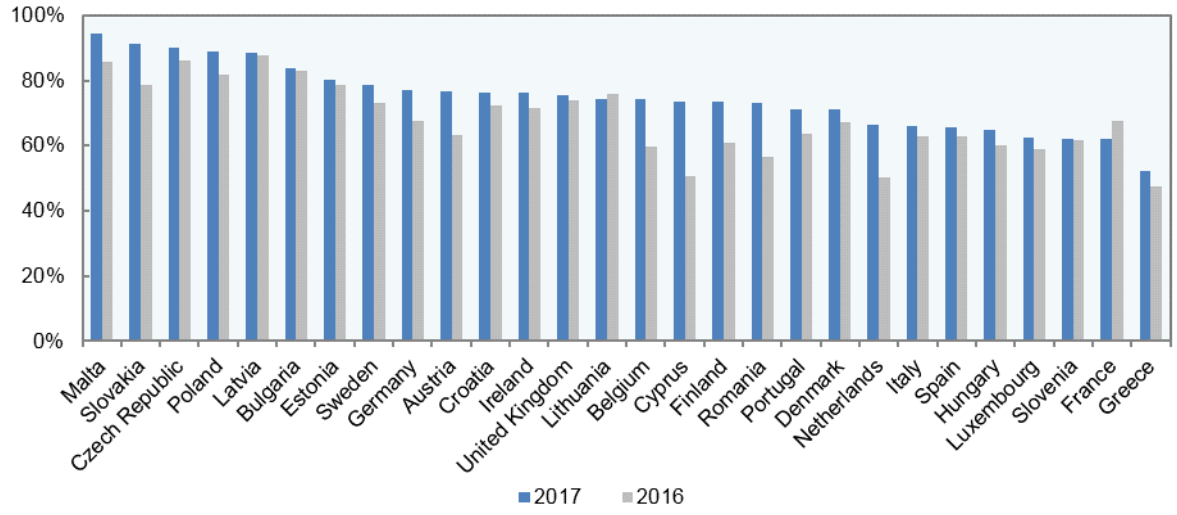
[2] Results are weighted by firms' value added.

[3] Compared to EIBIS 2016. Exceptions are France and Lithuania.

[4] On the cyclical component of skill mismatches also see the contribution of Canton, Thum-Thysen et. al.

to demographic developments, persistent frictions in labour markets, firm-level factors that limit the ability to hire and keep staff with the right skills, or issues with the quality and relevance of education systems (or parts thereof). In addition, the spread of digital technologies could add to firms' perceived lack of skills if demand for new qualifications is changing faster than skills supply.

Figure 2. Lack of skilled staff as impediment to investment by member state



Base: *All firms. Q. Thinking about your investment activity in […], to what extent is lack of staff with the right skills a major or minor obstacle or not an obstacle? Bars combine shares for 'major' and 'minor' response options.*

While concerns about skills are prevalent among firms in the EU, they are particularly pronounced for countries in Central Eastern and South-Eastern Europe. In the CESEE region,[5] some 83% of companies see it as an impediment to investment compared to 70% in non-CESEE countries and firms find it to be a major obstacle more often. The share of companies' finding lack of skills to be a problem in CESEE increased by some 5pp yoy from already elevated levels in the previous wave. For the CESEE region, skill gaps and shortages pose particular concern as they could hamper convergence and the transition to a more innovation-led growth model. Specific factors adding to problems with the availability of skills in CESEE include demographic developments and emigration of (skilled) personnel, as well as a higher proportion of smaller firms in the region, which tend to invest less in training.[6] Also, some countries in central and Eastern Europe spend a relatively small share of national wealth on education compared to European peers.

[5] CESEE includes Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia, Slovenia, and Poland.

[6] For further discussion also see e.g. EBRD transition report (2017-18), 2017. EIBIS responses suggest considerably lower investment in training by employee and relative to turnover for CESEE countries.

3.2 Which firms are missing skills?

Perceptions of skills (or the lack thereof) as an impediment to investment are not sector-specific but widely-shared across industries. About 69% of firms in the infrastructure and services sectors name it as a concern. Firms in construction and manufacturing find it even slightly more pronounced (75% and 77% respectively). Notably, construction and manufacturing are the two sectors where concerns about skills have increased the most compared to the EIBIS first wave (+ 6pp and 9pp).

Limited availability of skills is a problem confronted by firms of different size. Both large and small firms see it as an impediment to investment (some 73% of large firms and 72% of SMEs respectively). Notably, small and medium-sized companies tend to name it as a major impediment more often (43% compared to 38% for large corporates), a pattern consistent with previous results.[7] Similarly, this difference in salience exists in a majority of member states in both years. However, the extent to which SMEs put greater emphasis on skills as a (major) investment impediment compared to large corporates varies considerably across member states.

Firms' responses also suggest that limited availability of staff with the right skills often is a more pressing concern for younger firms. While both younger and older companies see it as an impediment, young corporations are on average more likely to cite skills as a major problem (Figure 3). Furthermore, limited availability of skills tends to be more of an issue for firms that have been growing employment. With respect to capacity utilization, results suggest that firms operating above capacity tend to be most concerned about the availability of skills. Corporates operating at full capacity are least – also compared to peers operating below full capacity. This is likely to reflect a mix of macroeconomic conditions and firm-specific factors. Companies in the first group could experience better than expected demand conditions, prompting them to expand production quickly with staff needs just being slower to adapt. Companies at full capacity could include some for which the availability of staff has not become such a pressing issue yet as well as firms that are better at planning staff needs in line with (expected) capacity utilization. Finally, the third group could include firms which are operating below capacity also because they miss staff with the right skills or they could be more inclined to name it as an issue because the firm currently does not perform that well.

EIBIS results also suggest that firms which invested in the past year tend to be more concerned about skills as a factor impeding investment. Those who expect their investment to result in additional employment tend to see limited availability of the right skills as an impediment more frequently, potentially anticipating hiring difficulties. Firms that expect employment due to investment to stay about the same are relatively less concerned, also

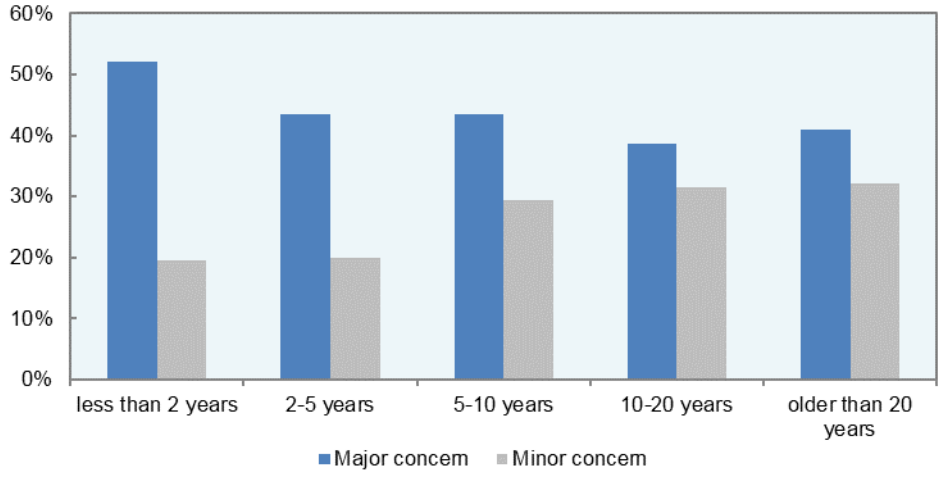
[7] 40% (SME) and 35% (large firms) in the first EIBIS wave.

compared to corporates which expect the number of employees to decrease due to investment. Concerns about the availability of skills in the latter group might also point to investment changing skill needs, e.g. due to acquisition of new technologies, in some cases.[8] Firms planning to step up investment activity also tend to be more concerned about the availability of skills.

Notably, companies that export and innovate report the availability of skills more frequently as a concern, suggesting that limited availability of skills often tends to concern and eventually hold back companies that are relatively competitive and more dynamic.[9] While this holds across Europe, shortages are again particularly pronounced for exporters and innovators in the CESEE region. (See Figure 4)

Which companies miss skills (the most) matters for the economy at large. If specific groups of firms, for instance smaller corporations or innovative ones, face particular issues to hire and keep talent, this could slow down churning in the economy and negatively affect innovation and growth on a wider scale. More challenging to trace are interactions between a (perceived) lack of skills at the firm level and implications for adoption of innovation and new technologies. For example, a firm may not adopt new technologies as it is not fully aware of latest technological developments - also due to a lack of skills (internally) - but may not link it to this source.

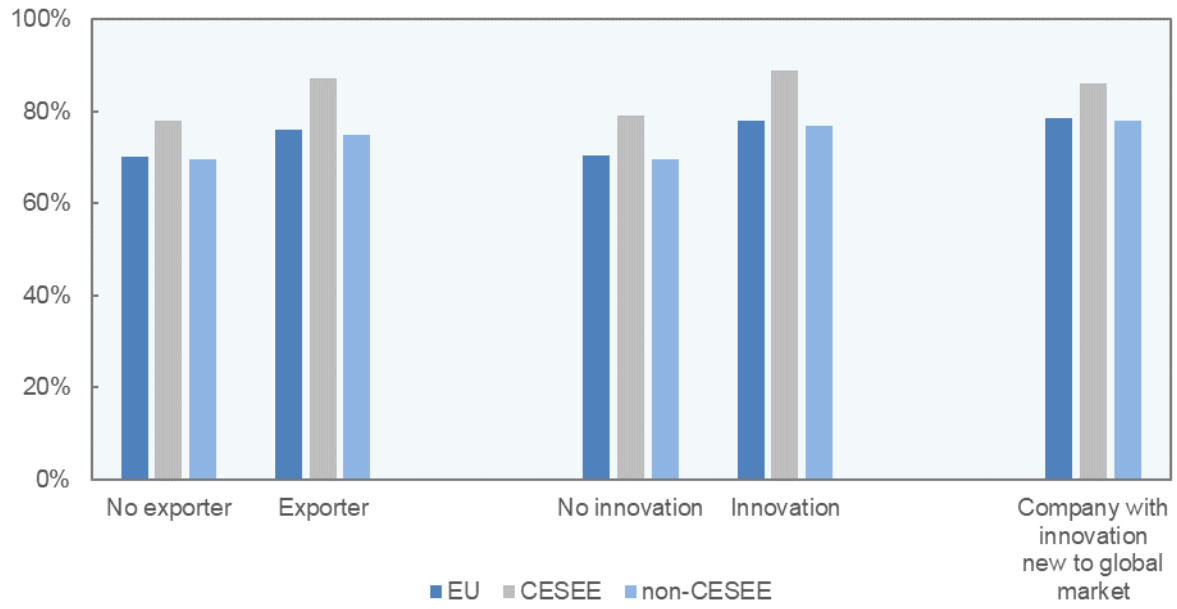
Figure 3. Skills: A more pressing concern for younger firms (EU average, 2017)



Base: *All firms. Q. Thinking about your investment activity in […], to what extent is lack of staff with the right skills a major obstacle, minor obstacle or not an obstacle?*

[8] More fine-grained analysis would be needed to better size the impact of investment in technologies in particular, e.g. accounting for differences across sectors and investment priorities across firms.
[9] On innovative firms slso see Investment Report 2017 ch.3.

Figure 4. Skills: Limited availability poses particular impediment for exporters and innovators



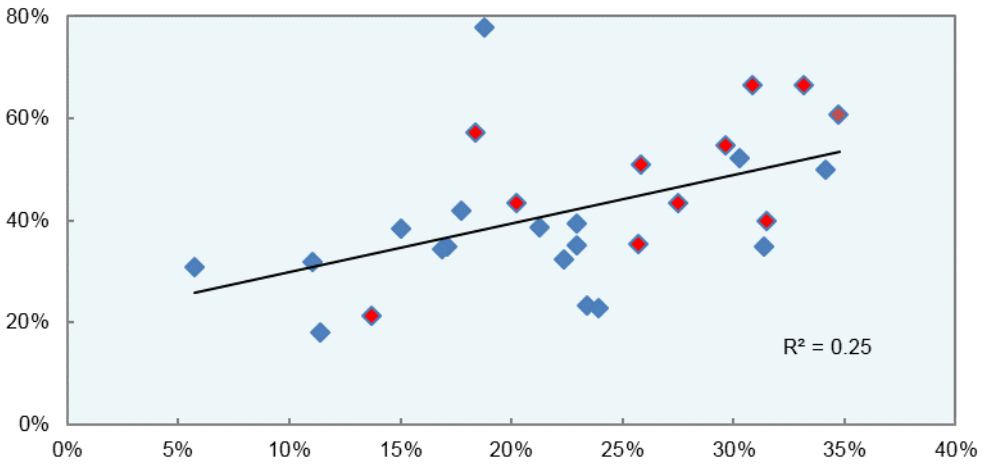
Base: *All firms. Q. Thinking about your investment activity in […], to what extent is lack of staff with the right skills a major obstacle, minor obstacle or not an obstacle? Bars combine shares for 'major' and 'minor' response options.*

3.3 Firms see education and training as priority for public investment

Firms' concerns about a lack of skills limiting corporate investment are reflected in their views on public investment priorities. Asked about the areas on which the public sector focus should focus on in the next three years, almost a quarter of respondents (24%) chose professional training and Higher Education (HE).[10]

[10] Firms were asked about the top area they would chose to prioritize for the next three years selecting from eight options. Alternative areas were 1. Childcare/schools, 2. Hospitals/care, 3. Transport infrastructure, 4. ICT infrastructure, 5. Social housing, 6. Public transport, and 7. Energy supply/distribution.

Figure 5. Limited availability of skills and policy prioritization



Data points refer to EU-member states. Red squares indicate CESEE countries. Horizontal: Share of firms selecting higher education and training for public sector to prioritize. Vertical: Share of firms citing availability of staff with the right skills as major impediment to investment.

Firms that prioritize HE and professional training are on average more concerned about skills being an obstacle to investment. Similarly, this can be discerned at country-level: Where more firms find a lack of skills to be an issue, they tend to emphasize public investment in training and higher education (Figure 5). Examples are Germany and Austria, where corporates state the limited availability of staff with the right skills to be particularly an issue and strongly suggest prioritizing investment in HE and training. Similarly, support for public investment in HE and professional training is strong in a number of CESEE countries. Despite the strong emphasis on HE and training in CESEE, transport infrastructure appears even slightly more relevant in direct comparison.[11] To some extent, this also reflects objective differences in availability and quality of transport infrastructure across countries.[12]

At the same time, a closer look at priorities also points to potential challenges for a policy area like higher education and professional training where investment returns often take long to materialize, are difficult to measure and subject to high uncertainty. While HE and training is among the top three priorities in all but three member states (Greece, Cyprus and Ireland are the exception here), priorities are not always clear-cut and there are of course a number of areas potentially important. A strong emphasis on HE and training by firms can only be observed in six member states, i.e. the area is considered top priority and

[11] 28% in CESEE name it as priority compared to 23% in non-CESEE countries while 24% suggest higher education and professional training in both CESEE and non-CESEE as priority. This appears to be particularly driven by Poland and Romania where transportation is considered more of a concern.
[12] See for instance the European Commission's transport scoreboard for further information.

alternatives only follow a distant second.[13] Yet it might also point to potential challenges for policymakers to sequence investment in the best manner or to address several areas (sufficiently) given limited resources, differences in time-horizons for investment projects and the distribution of benefits.

Finally, looking at responses for public investment priorities by sector, manufacturing firms, put particular emphasis on education and training as a priority for public investment in line with the sector perceiving limited availability of skills to more of an impediment. On average about a third of manufacturing firms name higher education and training as a priority.

3.4 Survey results and implications for research and (EU) policy

EIBIS results hold several implications for research and policy. First, corporates' growing concerns about skills and the potential negative implications for investment call for further analysis to disentangle the drivers of perceived skill gaps. The relevance of cyclical versus structural factors and micro- (firm specific) versus macro determinants related to firms' operating environment warrants a closer look and are a prerequisite for developing policy responses.

Second, the relative importance of the different drivers is likely to vary across member states, depending for instance on countries' business cycle positions, demographic developments and labour force mobility, and the structure of labour markets that affect the ease with which labour can reallocate. At the same time, the shared perception of skills being a critical factor – both for firms investment and for public policy – also suggests that skills are a 'European issue' in the sense that there is a common concern. Conditions to develop and enhance skills through education and training also play a role in mitigating skill gaps. To the extent that close to all investment in education is local, whereas the returns on these investments accrue at the European or even the global level – either through labour mobility or the mobility of ideas – a promising avenue for further exploration is whether national investment in education should be complemented by supranational funds (similar to the case of research and development).

Third, while short-term responses to skill shortages can include boosting training with close involvement of the business sector, standardisation and better recognition of qualifications and constant updating of curricula in the light of changing skill requirements. Longer-term measures should also focus on how best to prepare people for a working life in changing workplaces. Education systems that succeed in developing students' capacities of 'learning to learn' and possibilities to enhance and upgrade skills throughout working lives are key elements to limit skill shortages going forward. This points to a continuous need for

[13] This is defined as being the top concern with more than 10 pp distance to the second most relevant policy area.

investment in education and skills, strengthening cooperation between education and research institutions and the private sector and bridging gaps between education and training.

4. Automation, skills demand and adult learning

Mantas Sekmokas[1], DG Employment, European Commission

Dr. Konstantinos Pouliakas[2], Cedefop[3], University of Aberdeen Business School and IZA[4]

Key messages

- *It is widely expected across the world that the speed at which specific jobs are automated and robotised is and will be further increasing. However existing empirical data is limited and provides little insight into such developments in the recent past.*
- *Existing data also provides limited guidance on the future risk of automation, with many risk assessments depending on specific assumptions and type of data used for making such forecasts. These assessments have very wide range of estimations that can start from as little as 9% to as much as 47% of all jobs that might be at a high risk of automation.*
- *Most of these exercise use the assumption that jobs that are at lower risk of automation possess certain features about the nature of tasks in those jobs – being less routine or standardised, with substantial reliance on social interaction, creativity, complex problem solving or physical manipulation.*
- *Given the expected broad-based impact of those changes on the labour market, adult education systems should be ready to come to the forefront. They must be prepared for the scale of the challenge and be enabled to better provide all adults at risk of job transformation or outright job-loss with opportunities to continuously develop skills that are less likely to be replaced by automation and artificial intelligence.*

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[2] https://www.linkedin.com/in/konstantinos-pouliakas-6b1b361/
[3] European Centre for the Development of Vocational Training
[4] Institute of Labor Economics

In recent years the necessity to modernise adult learning systems is drawing widespread attention due to the growing debate on the risks posed by technological change, notably the potential of automation to drive job change and/or job destruction. Already in 2013 a research paper forecasted that up to 47 % of jobs in the US will be at risk of automation within the next 10 to 20 years (Frey and Osborne, 2013)[5], while a European application of the same methodology claimed that the proportion of the EU workforce affected by automation averages 54% across the EU28[6]. This approach assumes that all jobs within a particular broad occupational category have equal likelihood of automation; specifically the occupation-specific automation risk has been set using a combination of subjective experts' judgement and more objective identification of job attributes that are presumed to be impediments to automation, such as reliance on job tasks that are dependent on non-routine processes, creative thinking and/or problem-solving inter alia.

A more recent paper (OECD, 2016)[7], on the other hand, moves away from the assumption that changes in skills demand and the likelihood of automation would be applied uniformly across all job types within occupations. Using the data on job-tasks from the Survey of Adult Skills (PIAAC), they estimate that only some of the tasks in jobs are likely to be automated and therefore only around 9% of jobs would be at risk of automation to a very large extent. Besides the risk of automation of specific tasks, it also seems that different types of technologies used at the workplace also have different likelihood to drive automation. Following a similar logic, a large-scale study by McKinsey (2016) has recently shown that less than 5% of occupations are wholly automatable, whereas for 60% of occupations at least a third of their underlying job tasks may be subject to automation.

Overall it would seem that any forecasts very much depend on the type and quality of dataset used for forecasting and the specific assumptions made about the "automation likelihood" of tasks within specific occupations/jobs (OECD, forthcoming)[8]. Nevertheless, the tasks or jobs identified as having the highest risk of automation in all such exercises are similar as their selection is based on similar properties – routine nature of tasks, standardised or digitised content requiring less social interaction, complex problem solving and/or precise physical manipulation. In addition, some technologies are more likely to be labour augmenting, complementing human work – like computers and other ICTs, rather than labour substituting – such as robotic systems and some forms of artificial intelligence, which enable firms to harness the power of computing for engaging in intelligent decision-making regarding rapid product development and market prototyping.

[5] Frey, C. B. and Osborne, M. A. (2013) The Future of Employment: how susceptible are jobs to computerisation? Oxford Martin Programme on Technology and Employment, University of Oxford
[6] http://bruegel.org/2014/07/chart-of-the-week-54-of-eu-jobs-at-risk-of-computerisation/
[7] OECD (2016) The Risk of Automation for Jobs in OECD countries. A comparative analysis. OECD Social, Employment and Migration and working papers.
[8] OECD (forthcoming) Automation, skills use and training.

A recent detailed analysis by Eurofound further analyses the impact of change in composition of tasks (and therefore skills required to carry out those tasks) both within and between different occupations[9]. Notably, they find that use of ICT technology has been primarily driven by within-occupation changes, rather than growth of some specific, ICT-focused occupations. More importantly, they identify opposing trends within as compared to across occupations, as regards the level of job standardisation and routinisation. In their analysis they identify that occupations that have most routine and standardised job content have been contracting, even if at a slow speed. However, at the same time occupations that have until now been notable for their lack of routine and standardised work methods, particularly managers, professionals and clerks, have seen a significant increase in both routinisation and standardisation of their job content. This raises a question if the changing composition of job-tasks towards more routine and standardised methods could thus potentially increase the likelihood of such jobs being automated.

Similar conclusions are drawn on the basis of the Cedefop European skills forecasting model ([10]), which contrasts the skill needs and task content/technologies of the jobs projected to decline in employment between 2015-2025 (e.g. skilled agricultural workers, crafts and related trades, numerical and material recording clerks etc.) with those expected to grow (e.g. business and administration professionals, ICT professionals, science and engineering professionals, customer service clerks, assemblers, cleaners and helpers etc.). The analysis provides evidence that much of the anticipated employment growth in the next decade is associated with jobs that have entailed greater product innovation and customer-service orientation in recent years. It is also routine-biased, given that jobs declining in employment exhibit a greater reliance on routine tasks ([11]). Jobs expected to grow are in general more likely to require advanced cognitive (literacy, numeracy, foreign languages, problem-solving, learning to learn) and non-cognitive (communication, planning, customer service) skills, together with reliance on individuals possessing higher-level qualifications.

In addition to the aforementioned projections of changing skills needs mirroring historical structural changes in EU employment, Cedefop's *European skills and jobs survey* (Cedefop, 2015)[12] reveals that there is marked within-occupation changes in skills demand and task complexity that impacts on adult worker's skill requirements and, in general, on the type

[9] Eurofound (2016) What do Europeans do at work? A task-based analysis: European Job Monitor 2016.
[10] http://www.cedefop.europa.eu/en/events-and-projects/projects/forecasting-skill-demand-and-supply/data-visualisations ; Cedefop (2017), People, machines, robots and skills, Briefing note no. 9121, http://www.cedefop.europa.eu/en/publications-and-resources/publications/9121
[11] *Cedefop (2016), 'Rise of the machines: Technological skills obsolescence in the EU', #ESJsurvey Insights, No 8, Thessaloniki: Greece, available at: http://www.cedefop.europa.eu/en/publications-and-resources/statistics-and-indicators/statistics-and-graphs/esjsurvey-insights-no-8*
[12] Cedefop (2016) *Skills, qualifications and jobs: the making of a perfect match?* Evidence from Cedefop's European skills and jobs survey: http://www.cedefop.europa.eu/en/publications-and-resources/publications/3072; http://www.cedefop.europa.eu/en/events-and-projects/projects/european-skills-and-jobs-esj-survey ; Cedefop (2017, forthcoming) Insights into skill shortages and skill mismatch: Learning from Cedefop's European skills and jobs survey

and degree of individual skill (mis-)match. Overall, about 78% of adult employees in the survey experienced some change in the variety of their job tasks (with associated need for learning) since the time they started their job, while for 21% their job tasks remained the same throughout their job tenure. Unsurprisingly, individuals in low-skilled occupational groups (e.g. elementary occupations) are most likely to be in jobs with stagnant or declining task variety (namely, jobs susceptible to deskilling) but the survey also reveals that, other things being equal, low-educated workers, those with a prior spell of unemployment and employed in temporary contracts are also more likely to being employed in such non-dynamic jobs. For many of those workers feelings of skill underutilisation/overskilling tend to prevail even if they may be eventually susceptible to skill gaps in the medium-term, once the nature of their work methods and tasks become exposed to digitalisation.

For now, these changes in skill demand due to the proliferation of digital technologies still have been slow for many population groups affected by a so-called 'digital divide', namely the phenomenon whereby some individuals with particular characteristics (e.g. low educated, females older-aged, unemployed) do not have sufficient access to or use digital technologies in contrast to other groups (e.g. high educated, young, males, employed in private sector or in larger-sized firms (Cedefop, 2017).

Nevertheless, it is reasonable to expect that changes might be speeding-up given the growing maturity and substantial investment in artificial intelligence and other automation technologies. Even in 2014, 47% of adult EU employees were concerned that some of their skills are moderately or very likely to become outdated in the course of the next five years (Cedefop, ibid, 2015). This calls for policy actions to improve the capacity of adult learning systems to react in time to this increasing speed of change and changing demand for new skills. In particular, modernisation of adult learning should place greater emphasis on investing in skills for tasks that are relatively shielded from widespread automation in the near future. Called computerisation bottlenecks, they for example include tasks requiring creative intelligence, social intelligence or complex perception and manipulation and/or tasks based on human-robot interaction (Frey and Osborne, 2013)[13].

In any case, the evidence available on the content of jobs is still patchy and mostly dependent on very specific data sources from individual countries, for examples surveys on job-tasks in Germany[14], the United Kingdom as well as the United States' O*NET database[15]. One notable international survey that provides some preliminary insights into these issues is

[13] Frey, C. B. and Osborne, M. A. (2013) The Future of Employment: how susceptible are jobs to computerisation? Oxford Martin Programme on Technology and Employment, University of Oxford
[14] Dauth et al. (2017), 'German Robots-the impact of industrial robots on workers, working paper.
[15] The Occupational Information Network (O*NET) is a primary source of occupational information in the US. It contains hundreds of standardized and occupation-specific descriptors on almost 1,000 occupations covering the entire U.S. economy.

the OECD's PIAAC[16], which nevertheless has a different focus – to assess basic adult skills (literacy, numeracy and ICT). Other surveys providing relevant data on the issue, but limited to the European countries are CEDEFOP's European Skills and Jobs Survey and Eurofound's European Working Conditions Survey. Statistical surveys within the European Statistical System for the moment do not collect detailed information on the content of jobs/tasks in Europe, however a dedicated data collection for that purpose is now planned to be carried out in 2022[17].

To better understand what types of tasks people do in their jobs, what skills are required to carry-out them effectively and how these requirements change over time, improved data is required before reliable conclusions can be drawn. Moreover, not only better data, but also more consistent definitions, typologies and the general representativeness of tasks measures in statistical surveys are need[18]. Therefore one useful starting point for the development of an enhanced cross-national data collection on job content/tasks could be the classification framework, developed by Eurofound, to measure job content (see Figure 1 for more details).

Figure 1 – A classification of tasks according to their contents and methods

A. Job content

1. Physical tasks: aimed at the physical manipulation and transformation of material things:
    a. Strengths
    b. Dexterity
2. Intellectual tasks: aimed at the manipulation and transformation of and the active resolution of complex problems:
    a. Information processing
        i. Literacy (business, technical, humanities)
        ii. Numeracy (accounting; analytical)
    b. Problem solving
        i. Information gathering and evaluation of complex information
        ii. Creativity and resolution
3. Social tasks: whose primary aim is the interaction with other people
    a. Serving/attending
    b. Teaching/training/coaching
    c. Selling/influencing

[16] Programme for International Assessment of Adult Competencies, with its main product being the international "Survey of Adult Skills", carried out in 2011/2012 and to be repeated in 2022/2023.
[17] An ad-hoc module on job-skills is planned to be implemented as part of the European Labour Force Survey.
[18] Biagi, F. and Sebastian, R. "How robust is the evidence on routinisation for Europe". Joint Research Centre. Power Point accessed on 06-11-2017. www.coe.gouv.fr/IMG/pdf/COE-Slides_Paris_FB2_Y-_Punie_Ppt_2.pdf

d. Managing/coordinating

B. Methods and tools of work

1. Methods: forms of work organisation used in performing the tasks:
    a. Autonomy
    b. Teamwork
    c. Routine
        i. Repetitiveness
        ii. Standardisation
2. Tools: type of technology used at work:
    a. Machines (excluding ICT)
    b. Information and communication technologies
        i. Basic ICT
        ii. Programming

Source: Eurofound (2016) What do Europeans do at work? A task-based analysis: European Jobs Monitor 2016

The debate about whether technological progress is likely to replace humans and render their jobs obsolete is century-old. What seems to be different this time round are the relatively faster innovation cycles of new technologies, the fact that a greater share of older-aged workers will have to cope with changing skill needs over the course of their lifetime due to the demographic crunch, but also the fact that artificial intelligence has potential to substitute for a greater share of high-skill tasks, considered to be relatively insulated in the past.

It still remains to be seen whether this "second machine age" will prevail over humans in terms of the aggregate balance of job creation versus job destruction. Nevertheless, based on existing data collection efforts and those which will hopefully become available in future years, it is reasonable to assert that the major disrupting force of technological change takes place within jobs in the form of job-task transformation. This will continue to pose significant challenges for education and training systems in Europe and worldwide to equip and enable adult workers to efficiently adapt to changing labour market circumstances.

5. Investing in Europe's future education and skills: Public opinions on Vocational Education and Training[1]

Lidia Salvatore and **Ernesto Villalba-Garcia**, Cedefop[2]

Key messages

- *Cedefop's public opinion survey on vocational education and training (VET) provides a rich amount of information to understand better citizen's views on VET suitable to inform VET policy making. Understanding what people think about Vocational Education and Training (VET) is a decisive element in creating VET as an attractive educational option.*
- *While VET is perceived as having a good image and people generally display a positive attitude towards it, especially for its ability to equip people with the right skills and open up good labour market prospects for VET graduates, when compared to general education, the image of VET performs comparatively poor against general education. VET is still seen as a second best choice and for second-rate students. These results hint that VET is still confronted with a negative public discourse which tends to reinforce stereotypes and misconceptions.*
- *VET reforms should start from these not so positive or contradictory results. These are essential to understand how to improve VET attractiveness and effectiveness as they help identify and signal perceived barriers and areas for improvement.*

[1] The article is based on Cedefop (2017). *Cedefop European public opinion survey on vocational education and training*. Luxembourg: Publications Office. Cedefop research paper; No 62 http://www.cedefop.europa.eu/bg/publications-and-resources/publications/5562 . The current article does not constitute policy and might not necessarily present the views of Cedefop.

[2] European Centre for the Development of Vocational Training.

Europe needs to improve and maintain high level skills and competences to remain competitive and innovative against increasing global competition, rapid technological changes, fast changing labour market needs and demographic challenges. Skills are not only essential to access and progress in the labour market, they are also essential to achieve one's full potential and to play an active role in society. Indeed, policy makers have long recognised the importance of a skilled human capital for both economic and social prosperity. A growing body of research demonstrates equipping people with the right skills to fully realise their potential and talent is associated with large social and economic benefits not only for individuals but also for society and the economy as a whole[3]. Vocational education and training (VET) can play a strategic role in providing the European Union (EU) with a workforce ready for the challenges lying ahead.

However, while the strategic role of VET in facilitating transition into the labour market and in re-aligning the skills of the population to the labour market needs is widely recognised, participation in both initial and continuing vocational education and training differs greatly among the EU Member States and overall is still far from EU targets. The New Skills agenda for Europe adopted in 2016[4] shows the commitment of the European Union to work on a set of measures to support the modernisation of vocational education and training (VET) aiming at making VET a first choice. Even the best Vocational Education and Training (VET) policies will be successful only if they are implemented in a trustful environment and are well-received by individuals and societies. Making VET more attractive and effective, thus, requires a clear understanding of the opinions of the population. Identifying possible stereotypes and misconceptions shaping the concept of VET in people' minds, and understanding the challenges and limitations of VET experience from the end users' point of view are essential to inform VET policy-making and allow VET to become a real first choice.

Until Cedefop published its *European public opinion survey on vocational education and training*[5] in 2017, scarce evidence existed on citizens' perceptions of VET in the European Union. The survey, designed to complement existing European data sources and statistics, provides unique comparative information on how EU citizens view VET in their country. Conducted in June 2016, the survey examined EU citizens' awareness and opinions on attractiveness and effectiveness of VET, as well as their own personal experience at upper secondary level - the stage of education that comes after compulsory education (typically carried out at age 16-18), across a representative sample of European residents aged 15 and over, making a total of more than 35000 interviews across the 28 Member States.

[3] Cedefop (2017). *Investing in Skills pays off: the economic and social benefits of low-skilled adults in the EU*. Luxembourg: Publications Office. Cedefop research paper; No 60 http://www.cedefop.europa.eu/en/publications-and-resources/publications/5560 .
[4] http://ec.europa.eu/social/main.jsp?catId=1223
[5] Cedefop (2017). *Cedefop European public opinion survey on vocational education and training*. Luxembourg: Publications Office. Cedefop research paper; No 62 http://www.cedefop.europa.eu/bg/publications-and-resources/publications/5562

The survey shows a positive citizen perception of VET in EU Member States. Around 68% of Europeans think that VET at upper secondary level has a positive image. This is especially in relation to its capacity for providing job opportunities, preparing people for the world of work, and matching employer needs. EU citizens also generally agree that VET plays an important role in society, specifically by strengthening their country's economy, reducing unemployment and tackling social exclusion. This translates in significant support for national governments prioritising investment in vocational education at the upper secondary stage.
One would expect a positive image of VET in the country to be associated with a high level of participation in VET but data do not support this claim. Indeed, in assessing VET image further, when asked to compare VET with general education, a majority of respondents (3/4) tend to agree that general education has a more positive image than VET, that VET is mainly for students of lower academic performance (3/4 respondents), and that obtaining a VET qualification is usually easier than obtaining a qualification in general education (75%). This holds in almost every member state. Addressing and reversing these perceptions requires exploring in depth their possible causes, and addressing potential negative biases.

Promoting the benefits of VET in terms of its ability to equip people with the right skills and open up good labour market prospects may contribute to a positive image of VET. Indeed, VET graduates are generally more satisfied with their learning outcomes than general education graduates; this is especially true of work-related skills developed (87% compared to 62% general education participants). General education students are more satisfied when it comes to some of the key competences acquired during their upper secondary education: the ability to speak a foreign language and develop cultural awareness. However, the sense of initiative and entrepreneurship, as well as the ability to be creative, have the opposite pattern, with VET students showing more satisfaction than general education students.

Moreover, VET seems to be clearly associated with positive labour market outcomes. In line with the perception that VET graduates at upper secondary level find a job quicker than graduates of general education at upper secondary level and of higher education, VET graduates tend to need less time to find their first long-term job than general education graduates, while reporting similar career satisfaction. Promoting the positive labour market outcomes of VET graduates may contribute to enhance a positive image of VET and to break existing biases and misconceptions.

Indeed, VET is generally associated with an education that prepares you for a specific occupation (87%) and rarely connected to higher education such as university (45%). Not perceiving VET as offering progression opportunities to higher education tends to reduce its attractiveness and is a major argument for those who opted for general education. This conceptualisation of VET is in line with the reason for choosing VET. Vocational education

students tend to report that the likelihood of finding a job guided their choice of education at upper secondary level (46%), while general education students tend to report their choice as based on the possibility of continuing to higher education (45%). Only 39% of VET graduates at upper secondary education, reported they continued studying at a higher level of education after finishing their upper secondary education, compared to 72% of general education graduates. Breaking this general education/higher education duality might be a necessary condition to make VET more attractive.

Within this context, although in most Member States recent reforms have opened up VET routes, so that, structurally, there are few dead-ends left, citizens views on the permeability of VET (the possibility of passing from one strand of education to the other) are still mixed. Horizontal permeability, i.e. the possibility of switching from vocational education to general education at upper secondary level, is perceived as easy for two in five EU citizens (41%), but almost the same proportion (42%) thinks it would be difficult. In terms of vertical permeability (the possibility of continuing to higher education after VET at upper secondary level), just over half of Europeans (54%) agree that 'it is easy to continue into higher education such as university after vocational education at upper secondary education'. This shows that many countries still confront a negative public discourse on VET which tends to reinforce stereotypes and misconceptions and that the potential of information and lifelong guidance is not fully used in these contexts.

This is supported by a strong correlation between the level of information people receive and their participation in VET programmes. In countries where more people are given information on VET at the time of choosing an educational path, there are more VET participants. Less than half of those who opted for general education at upper secondary level say they were given information about vocational education, and one in four say that someone advised them against taking vocational education when they were deciding on their upper secondary education. Although we cannot assume causality, it seems clear that information and guidance play an important role in making VET an attractive option.

Finally, promoting the benefits of lifelong learning and continuing vocational education and training (CVET) may also contribute to improve VET attractiveness. Skills mismatch and skills obsolescence due to demographic challenges, rapid technological change and changes in product/process innovation and work organisation imply people will have to constantly update and upgrade their skills throughout their careers. However, only about one in five respondents (21%) whose upper secondary education was primarily vocational say they participated in work-related training in the previous 12 months. This proportion is slightly higher among those who followed general education (26%) but significantly lower among those who did not continue to upper secondary education at all (9%). In line with existing literature and data on participation rates in CVET and Adult Education, participation rates

are overall still far from EU targets, and people most in need of education, training and upskilling are less likely to participate in learning activities.

In conclusion, the survey provides a rich amount of information to understand better public opinions on VET. Europeans tend to have a positive image of VET, especially in relation to its ability to equip people with the right labour market skills and providing good employment opportunities, however VET is still confronted with a negative public discourse which tends to reinforce misconceptions and stereotypes. Promoting the benefits of VET not only for the individual participants but also for the employers, as well as for societies and the economy as a whole[6], may contribute to break this negative patterns and to increase VET attractiveness. Positive attitudes towards prioritisation of investment in VET[7] may suggest that the general public recognises the potential of VET in ensuring that every person is equipped with those skills needed to fulfil his/her talent and potential.

The potential of information and lifelong guidance should be further exploited. Providing more information and guidance on VET may help addressing those information gaps which may prevent people from choosing VET, such as information on progression opportunities to tertiary education from VET or VET programmes at higher educational level. VET policy making should ensure relevant and good quality VET offers are flexible and adaptable enough to respond to fast changing labour market needs and rapid technological changes, building on labour market intelligence and involving all relevant stakeholders.

Investigating VET perceptions and understanding the challenges and limitations of VET experience from the end users' point of view, are essential to inform VET policy-making and to allow VET to become a first choice. Overall the survey provides a rather positive picture of VET in Europe, however VET reforms should start from the not so positive or contradictory results. These are essential to understand how to improve VET attractiveness and effectiveness as they help identify and signal perceived barriers and areas for improvement and where further investment is needed.

[6] In this context Cedefop has carried out several studies analysing the benefits of investing in skills and in VET in particular. See for example Cedefop latest study on the benefits of investing in upskilling: Cedefop (2017). *Investing in Skills pays off: the economic and social benefits of low-skilled adults in the EU*. Luxembourg: Publications Office. Cedefop research paper; No 60 http://www.cedefop.europa.eu/en/publications-and-resources/publications/5560 . A full list of Cedefop publications assessing VET's benefits can be found here: http://www.cedefop.europa.eu/en/events-and-projects/projects/assessing-vets-benefits/publications

[7] When asked whether their national government should prioritise VET over general education at the upper secondary stage around half (49%) of respondents indicated investment in VET should be prioritised, 28% indicated general should be prioritised, while the remainder either do not know (12%) or spontaneously believe neither should be prioritised (11%).

6. What is there to learn from the German dual apprenticeship system?

Lars Thies, Bertelsmann Stiftung

Key messages:

- *Established apprenticeship systems ensure a smooth transition from education to employment*
- *Rather than try to copy the system, other countries should adapt certain elements of it to fit into their education systems*
- *Making the business case for dual training and involving employers in the design of vocational profiles as well as in the delivery of training is key.*

Dual apprenticeship systems are widely recognized for allowing young people to easily transition from education into employment. Indeed, youth unemployment rates for countries with established dual Vocational Education and Training (VET) systems such as Austria (11.2 %), Switzerland (8.6 %) or Germany (7.1 %) are well below the European average (18.7 %).[1] Since the mentioned countries also show a good overall macroeconomic performance and strong labour markets, how much of this success in terms of youth unemployment can be attributed to the apprenticeship system?

Although an exact assessment would be difficult to undertake, there at least three reasons which make it safe to assume that dual VET plays an important role in reducing youth unemployment in Germany[2]:

1. Within their apprenticeships, young people learn skills which are truly in demand by employers. This is ensured on the one hand through the component of work-based learning – apprentices spend roughly half of their time in a vocational school and the

[1] Unemployment rate for young people aged 15-24; Source: Eurostat, data for 2016.
[2] In the following I will use the German example since I am most familiar with it. Dual VET in Austria, Switzerland or other countries is organized in different ways although the basic principles are similar.

rest within a company. On the other hand, employers have a say in the design and re-design of vocational profiles and curricula.

2. National vocational qualifications have a strong signalling effect on the labour market. There are about 330 vocational profiles for dual VET in Germany and the curricula for these are the same across Germany. An employer in Bavaria therefore more or less knows what an electrician who has been trained in Hamburg can do and what his training entailed.
3. Apprentices are already in contact with employers. Young people on the labour market are often at a disadvantage compared to older workers, because they have now professional network and no work experience. Apprentices not only gather work experience during their training, they also can also prove themselves for a prospective employer. More than two thirds of apprentices in Germany are taken on by their training company after the apprenticeship has ended.[3]

If the apprenticeship system is so successful in bringing young people into employment, should other countries then try to copy it? For two reasons the short answer to this question is no. First, the dual VET system in Germany rests on a complicated institutional structure, a history of social partnership and a willingness of employers to train, all of which would be difficult to implement from scratch elsewhere. The same goes for other dual VET systems.

Second, despite its success the dual VET system in Germany faces a number of challenges and will have to change in order to remain as relevant for workforce development in Germany as it is today. Participation in dual VET in Germany is decreasing in the long run on the side of the employers as well as on the side of young people. Between 2007 and 2016 the number of apprenticeships being offered by businesses fell by 12.5 per cent. Particularly small businesses with up to 50 employees have reduced their number of apprentices, even though they still supply 44 per cent of all apprenticeship positions.

During the same period, the number of young people applying for an apprenticeship fell by a fifth (-20.6 per cent).[4] This is due in part to changing demographics. Less young people leave the general education system each year. A second important factor however is that more and more young people choose to go to university rather than vocational training. The decrease in participation happens at a time of strong economic growth in Germany, record highs of employment and the beginning of labour shortages particularly of vocationally qualified workers.

[3] In some sectors the initial employment after the apprenticeship is part of a collective labour agreement and therefore guaranteed for one or two years if the apprenticeship was completed successfully.
[4] For these and other indicators measuring equal opportunity and effectiveness of VET in Germany see the State Report on Vocational Training 2017, a research project supported by the Bertelsmann Stiftung. Results are available at: www.laendermonitor-berufsbildung.de (in German).

While participation in dual VET is decreasing overall there is a growing mismatch between open apprenticeship positions and applicants. While 7.7 per cent of offered apprenticeship positions in companies could not be filled in 2016, 13.4 per cent of applicants are unsuccessful. The reasons for this mismatch are in part geographical since there is considerable variation in the ratio between offered positions and applicants between regions in Germany. Another factor is the variation in supply and demand of apprenticeships for different professions. In professions such as car mechanic, office manager or bank officer demand for apprenticeships far outstrips the supply. On the other hand, apprenticeship positions for cooks, painters and other professions that seem unattractive to young people are hard to be filled.

On could say, that the overall tasks for the dual VET system in Germany are similar to countries where dual VET is currently being introduced: making vocational training attractive for young people and motivating businesses – particularly small and medium sized ones – to engage and invest in dual VET.

Conclusions

Despite the mentioned challenges for the system in Germany dual VET can still be a very successful model with wide benefits for businesses and young people alike if implemented right. Although not serving as a model to be copied, the German example holds some lessons for countries or regions trying to implement dual VET:

Introduce work-based learning: The core of the dual VET system is the dual principle, i.e. the alternation between learning at a vocational school and learning at the workplace. In countries with a predominantly school-based VET system, work-based learning opportunities could be introduced as a first step to increase the value of VET for both students and businesses. This might be achieved easier and faster than introducing a full dual apprenticeship system.

Make the business case for dual VET: As mentioned above, the number of small businesses engaging in vocational training is decreasing in Germany. For many however, the more surprising fact is that still 9 per cent of businesses with up to 5 employees and 38 per cent of businesses with 6 to 49 employees actually do train apprentices which includes paying them a monthly wage. Businesses do not see apprentices only as a cost or an investment which can be lost if the apprentice is poached by a competitor. Research from Germany and also from Switzerland shows that in many cases businesses can profit from taking on apprentices even during the time of the apprenticeship.[5] This is the best argument to convince businesses to engage in vocational training.

[5] Supported by the JP Morgan Chase Foundation, the Bertelsmann Stiftung is conducting ex-ante simulations of costs and benefits of apprenticeship training for firms. The first report: "Apprenticeship Training in Spain – a

Involve employers in the design of curricula and vocational profiles: This ensures that apprentices will learn skills that are truly in demand by employers and eases the transition between training and employment for young people. Having profiles and curricula in place which are accepted by a whole industry or even nationally also allows for greater mobility of workers and greater transparency for hiring decisions.

Promote dual study programmes: Vocational training often suffers from the bad image of only leading to blue-collar jobs. That is why many young people and also many of their parents strive for a degree in higher education even though the employment prospects with vocational training would be better. In many countries more than half of young people enter higher education and it would be difficult to generate enough demand from young people if a dual VET system would be introduced. A promising model in this case is to combine higher education with in-firm vocational training. In Germany, these so-called dual study programmes are in high demand both by employers and students[6] and offer excellent employment opportunities for their graduates.

Cost Effective Model for Firms?" is already available online: https://www.bertelsmann-stiftung.de/en/topics/aktuelle-meldungen/2015/oktober/spain-could-reap-benefits-of-apprenticeship-training/. Reports on Italy and the UK will be published in the course of 2018.

[6] In Germany in 2016 about 100,000 students were enrolled in dual study programmes and 47,000 businesses were partners to these programmes.

7. Incentivizing training participation of employees: Evidence on training vouchers

Marcus Tamm, RWI[1] and IZA[2]

Key messages:

- *Investments made after labor market entry account for a quarter of skills and competences learned over a person's lifetime that are relevant for the labor market. During adulthood, non-formal (on-the-job) training constitutes an important part of lifelong learning of employees. Within Europe there are large differences with respect to participation rates in training.*
- *Many countries try to incentivize adult education and especially work-related or on-the-job training. One policy measure are training vouchers.*
- *In 2008, the training voucher program Bildungsprämie was introduced in Germany. Similar to other voucher programs, the overall assessment of the Bildungsprämie voucher is rather mixed.*
- *If the aim is to specifically focus on training participation of low-educated employees, another element might be removing information deficits on the general importance of training and, more importantly, on the training market and on specific training courses and skills that might be relevant in the individual situation of the employee.*

7.1 On the importance of adult education

Learning does not stop after leaving school, the VET system or higher education. Estimates in Heckman et al. (1998) suggest that investments made after labor market entry account for a quarter of skills and competences learned over a person's lifetime that are relevant for the labor market. During adulthood, non-formal (on-the-job) training constitutes an

[1] Leibniz Institute for Economic Research (formerly Rheinisch-Westfälisches Institut für Wirtschaftsforschung).
[2] Institute of Labor Economics.

important part of lifelong learning of employees. In times of digitalization, automation and routinization, training during adulthood is likely to gain in importance in most developed countries. In order to adapt to changing job requirements and to avoid longer periods of unemployment, workers have to continuously participate in training.

Within Europe there are large differences with respect to participation rates in training. Eurostat (2017), for example, shows country specific participation rates using data from the Adult Education Survey 2011 (AES).[3] AES focuses on training participation within the 12 months preceding the interview. While in some countries like Sweden or Luxemburg more than two out of three adults participate in non-formal training at least once during a one year period, in other countries only around one out of three adults do (e.g. Belgium, Bulgaria, Czech Republic, Ireland, Spain, Italy, Latvia, Lithuania, Malta, Poland, Slovenia, and United Kingdom). In Germany, the participation rate is close to 50%.

Taking the importance of education and skills into consideration, many countries try to incentivize adult education and especially work-related or on-the-job training. One policy measure are training vouchers. The underlying rational for vouchers is that the (direct) cost of training is partly or fully taken over by the government. This is intended to overcome borrowing or financial constraints on the side of employees and to factor in positive external effects of training (i.e. effects that are beneficial for the society as a whole, such as increased revenues from income taxes or lower expenditures on unemployment benefits). In the following I shortly discuss results from evaluation studies that investigate the effectiveness of training vouchers. Specifically, I look at the German case and the *Bildungsprämie* voucher. For a broader overview on alternative policies promoting adult education of the workforce see Oosterbeek (2013).

7.2 Evidence on the effectiveness of training vouchers

In 2008, the training voucher program *Bildungsprämie* was introduced in Germany. Similar voucher programs already existed in Germany at the regional level (e.g. *Bildungsscheck NRW*, for an evaluation study see Görlitz, 2010) and have been implemented since (e.g. *Bildungsscheck Brandenburg*, *Weiterbildungsbonus Hamburg*, *Weiterbildungsscheck Thüringen* etc.). Other European countries also have experience with voucher programs.[4] The design of the *Bildungsprämie* underwent several slight changes; in the following I present the design as of 2010 which is the time relevant for the evaluation studies published in Görlitz and Tamm (2016a and 2017).

[3] OECD (2017) shows similarly large country differences using data from the Survey of Adult Skills 2012/2015 (PIAAC).

[4] For example, Abramovsky et al. (2011) evaluate a pilot program in the UK, Hidalgo et al. (2014) evaluate a pilot program in the Netherlands and Schwerdt et al. (2012) present results on a field experiment in Switzerland.

The voucher was targeted at employees with low or medium income and it reduced direct training costs (i.e. fees for participation in training courses that are charged by the providers of training) by 50% up to a maximum subsidy of 500 euros. The voucher could be used for work-related training at the vast majority of German training providers. The direct training costs that remained after deducting the voucher had to be borne by the applicants themselves, i.e. employers were not involved in the funding. To receive a voucher a mandatory personal counseling in one of around 500 offices located all over Germany was necessary. The voucher reduced individuals' fees immediately when booking a course with a training provider. Training providers had to send in vouchers to a governmental agency for reimbursement. The governmental agency checked whether the topic of the training course coincided with what was agreed on in the counseling and whether the fee remaining after deducting the voucher was actually paid by participants themselves. According to RWI et al. (2012) around 63 000 vouchers were issued in 2010 and around 96 000 vouchers in 2011. The average redemption rate of vouchers was close to 80% and the average subsidy of the vouchers was around 344 euros.

Similar to other voucher programs, the overall assessment of the *Bildungsprämie* voucher is rather mixed. There are several positive aspects of the program:

- Participants experience a positive return to voucher-financed training. Based on an approach using a comparison group of non-participants, Görlitz and Tamm (2016a) show that after participation in the training co-financed by the *Bildungsprämie* individuals are more often engaged in non-routine tasks. Given that routinization has led to drastic changes in labor markets during the last couple of decades resulting in a decline of jobs with routine tasks and a rise of jobs with non-routine tasks (e.g. Autor et al. 2003), this can be interpreted as beneficial for future employment prospects. Other voucher programs also show positive returns to training for participants. For example, Schwerdt et al. (2012) show positive effects on earnings and employment, especially for low-educated individuals and Dauth and Toomet (2016) show positive employment effects for older workers.
- The *Bildungsprämie* voucher specifically attracts employees from sectors and employers that are unlikely to finance training (RWI et al. 2012).

However, there are several other aspects that do not hint at a complete success of the program:

- It is unclear how much training has really been incentivized by the voucher. Evidence discussed in Oosterbeek (2013) shows that this is a general problem of training vouchers. Oosterbeek (2013) indicates that the deadweight loss of vouchers is easily up to 90%. This implies that in order to incentivize one employee to participate in training ten vouchers have to be financed and nine out of the ten vouchers will be used for training that would have taken place even in the absence

of the voucher. For the *Bildungsprämie* the actual deadweight loss is unclear. On the one side, RWI et al. (2012) show that 62% of participants mention that they would have participated in training even without the voucher. On the other side, self-assessed information on deadweight loss is likely to be biased and the actual deadweight loss might be higher.

- Evidence presented in Görlitz and Tamm (2017) suggest that financial constraints are relevant only for a small share of the population eligible for the *Bildungsprämie*.
- Low-educated workers are not the main beneficiaries of the *Bildungsprämie* voucher. In contrast, the difference in training participation between low- and highly-educated workers is on average larger for voucher-financed training than for work-related training in general (RWI et al. 2012).
- The bureaucratic burden and the administrative costs for training providers and especially for the government are rather high in relation to an average subsidy of 344 euros for each training participant. As mentioned above, there is an individual counseling, training providers have to submit vouchers to a governmental agency for reimbursement and the vouchers are checked individually with respect to training content and payment of the fee that remains after deducting the voucher.

7.3 General remarks and suggestions

The overall finding that the deadweight loss of training vouchers is high calls into question that credit constraints are the main barrier for training participation, at least for populations as broadly defined as those eligible for the *Bildungsprämie*. Reasons for nonparticipation in training are highly diverse and voucher programs exclusively remove financial constraints. Thus, vouchers will not work when other reasons for nonparticipation prevail. Having said this, note that there are certain groups in the population for whom financial constraints are relevant (e.g. Görlitz and Tamm 2017) and for whom training vouchers might be a valuable instrument. To concentrate on these cases, vouchers need more targeting. Vouchers might also be more successful in countries where financial constraints are more of importance. Results from PIAAC data, for example, indicate that the relevance of "costs" as a barrier to participation in formal or non-formal education largely differs between countries (OECD 2017).

Most work-related training in Germany and in Europe is financed by firms, either by taking over (part) of the direct training costs or by enabling training during working hours (e.g. Bassanini et al. 2007). Furthermore, firm-financed training appears to be more accessible for low-educated employees than self-initiated training (Görlitz and Tamm 2016b). Firms or employers, however, have not been involved in the *Bildungsprämie* voucher – yet, this is different for other voucher programs. Given the important role of firms for training in

general, I would argue that policy measures addressing employers naturally have a bigger leverage to increase rates of training participation and are not increasing inequality as much as measures focusing on self-initiative.

If the aim is to specifically focus on training participation of low-educated employees, another element might be removing information deficits on the general importance of training and, more importantly, on the training market and on specific training courses and skills that might be relevant in the individual situation of the employee. For example, a pilot program on educational counseling that also addresses employees has recently been initiated by the German Federal Employment Agency. First results seem promising (Fuchs et al. 2017) but no real evaluation study using appropriate comparison group designs has been published yet.

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