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Challenges Facing European Labour Markets: Is a Skill Upgrade the Appropriate Instrument?

The financial and economic crisis shattered the Lisbon Strategy's attempt to increase the EU's employment rate to 70% among 15-64 year olds by 2010. The new Europe 2020 strategy envisages a 75% adult employment rate by 2020; however, this goal also seems unrealistic in light of the economic crisis which has caused the EU's employment rate to drop significantly below 70%. A crucial question now is whether a skill upgrade of the European labour force would help to increase the employment rate, especially among youth. This Forum explores the relationship between education and employment throughout the EU.

Stefano Scarpetta and Anne Sonnet*

Investing in Skills to Foster Youth Employability – What Are the Key Policy Challenges?

The global financial and economic crisis of 2008-09 hit young people around the world very hard. Youth unemployment increased significantly in most OECD countries, even in those where the increases in overall unemployment were contained; during the sluggish recovery which began in 2010, many young people have been struggling to find a job and are now at high risk of prolonged periods of joblessness and exclusion. Investing in youth to give them a fair chance in the world of work is more than ever a key policy priority in all countries.

High youth unemployment and inactivity are not new, even if they have been exacerbated by the recent crisis, and many OECD countries have devised strategies to improve the matching of the skills youth acquire at school and those needed in the labour market in order to render the school to work transition easier.¹ Many of them have reinforced these strategies during the crisis to address the growing concerns about the risk of the so-called "lost generation". But have these strategies and renewed efforts been sufficient to give youth a fair chance in the world of work? The paper revisits this issue drawing from recent in-depth OECD reviews of youth employment policies.² It is organised as follows: first, the key facts on how young people have been faring in the labour market prior

to and during the crisis are presented³; the subsequent section analyses the main policies to improve educational outcomes and upgrade youth skills; and the last section focuses on broader policies dealing with education, labour market and social protection.

How Are Young People Faring in Today's Labour Market?

Youth have been disproportionately affected by job losses during the global crisis, and even over the past two years of (weak) economic recovery, access to jobs has remained difficult for many new labour market entrants. Consequently, youth unemployment has increased much more than overall unemployment in most OECD countries during the recession, and has shown no, or only limited, signs of easing in the recovery phase. Consequently, many youth are experiencing long spells of joblessness and facing a high risk of exclusion.

* Statistical assistance from Thomas Manfredi and Sébastien Martin in preparing the paper is gratefully acknowledged. The authors are also grateful to John Martin for his useful comments. The opinions expressed in the article are those of the authors and do not engage the OECD or its member countries.

1 OECD: Employment Outlook, OECD Publishing, Paris 2011.
 2 This paper draws heavily from a paper focussed on the risk of a jobless generation in the crisis (S. Scarpetta, A. Sonnet, T. Manfredi: Rising youth unemployment during the crisis: how to prevent negative long-term consequences on a generation?, OECD Social, Employment and Migration Working Paper No. 106, 2010) and the OECD: Off to a Good Start? Jobs for Youth, OECD Publishing, Paris 2010, which summarised the key lessons from 16 country reviews of the school-to-work transition carried out by the OECD Secretariat over the period 2006-2010.
 3 The term "youth" refers specifically to the 15/16-24 age group, except when otherwise specified. For Iceland, Spain, Sweden, the United Kingdom and the United States, "youth" refers to the 16-24 age group and to 15-24 for all other countries.

Job Losses Hit Youth Particularly Hard

In the two years of the Great Recession, youth employment fell by almost 8% in the OECD area (Figure 1), compared with a drop of 2% among adults. Low-skilled youth – those with less than upper secondary education – were the hardest hit (-11%), a dramatic contrast with the employment gain of 2% for tertiary graduates. The composition of youth employment also changed significantly during the crisis. While on average much of the job losses in OECD countries were concentrated among those with temporary, fixed-term contracts, among youth both permanent and temporary contracts declined sharply. Moreover, full-time employment for youth fell by 13%, while part-time employment fell by less than 3%. Overall, youth have suffered not only from their large exposure to temporary and precarious jobs that are particularly sensitive to business cycle fluctuations, but also from the operation of the *last-in-first-out* workforce adjustment strategy adopted by firms and their selective reduction in working time among remaining workers.

Youth Joblessness Has Increased During the Crisis

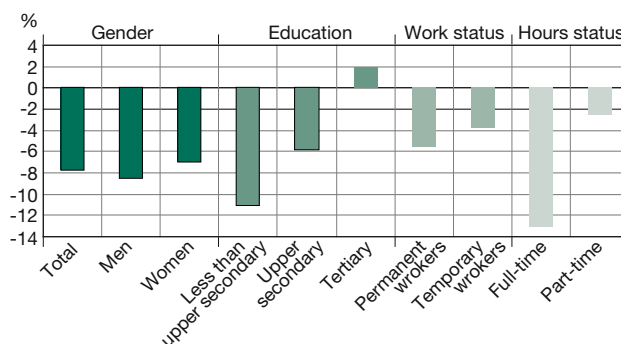
The large job losses among youth and the difficulty of many new entrants to find a job have resulted in a large increase in youth unemployment in many OECD countries. As shown in Figure 2, the youth unemployment rates for the OECD area rose on average from 13% in the third quarter of 2007 to 17.3% in the third quarter of 2011. The increase was particularly high in those countries where the Great Recession was most severe – notably, Ireland, Greece, Portugal, the Slovak Republic and Spain – while youth unemployment actually fell in Austria, Chile, Germany and Israel, four countries largely spared by the crisis. These heterogeneous performances led to a further widening of youth labour market conditions across OECD countries. In the third quarter of 2011, youth unemployment was below 10% in Austria, Japan, Germany, Korea, the Netherlands, Norway and Switzerland; it was in the range between 20% and 30% in France and Italy and reached 46% in Greece and 48% in Spain (Figure 2).

Inactivity Is a Bigger Problem Among Out-of-School Youth than Unemployment

The unemployment rate represents a good, albeit incomplete, measure of the difficulties faced by young people in the labour market. An important and growing number of youth who have exited the education system are not (or no longer) looking for work and thus are not included in the official unemployment statistics. An indicator that captures both exclusion from employment, but also from the labour market and education system altogether, is the

Figure 1
Youth (15/16-24) Employment Has Been Particularly Hit During the Crisis, OECD Area

Percentage changes in employment, 2008-2010¹



¹ Data by educational attainment refer to 2007 and 2009.

Source: European Union Labour Force Survey and national labour force surveys.

share of youth neither in employment nor in education and training – the so-called “NEET rate”. In the first quarter of 2011, this group accounted for 12.3% of all youth aged 15/16-24 in the OECD countries, up from 10.7% in the first quarter of 2008 (Figure 3).⁴ 22 million young peo-

⁴ Figure 3 shows another useful indicator: the unemployment to population ratio, which also compares the number of young unemployed to the entire population of that age group. By contrast, the youth unemployment rate only concerns the proportion of young unemployed in the youth labour force, i.e. those who have already left the school system and are active in the labour market.

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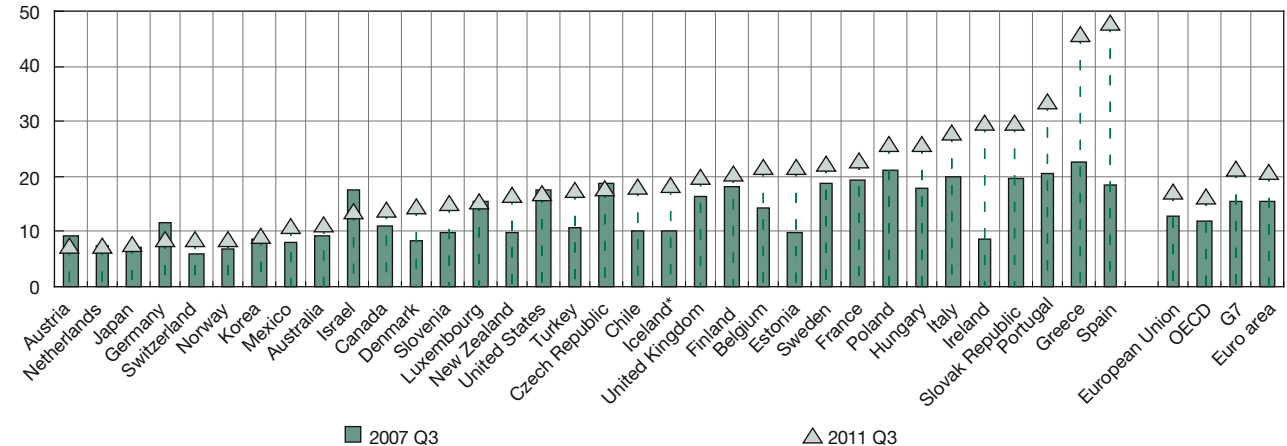
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Figure 2
Youth Unemployment Rate Has Increased During the Crisis, OECD Countries

As a percentage of the labour force aged 15/16-24



Note: Countries are shown in ascending order of the youth unemployment rate in 2011 Q3. Figures are seasonally adjusted. International averages refer to weighted averages. * Data refer to 2007 Q2-2011 Q2 for Iceland.

Source: OECD calculations based on Eurostat, Short-Term Indicators and various national sources.

ple were jobless in the first quarter of 2011, 14 million of whom were inactive and not studying, almost double the level of those who were unemployed (8 million).

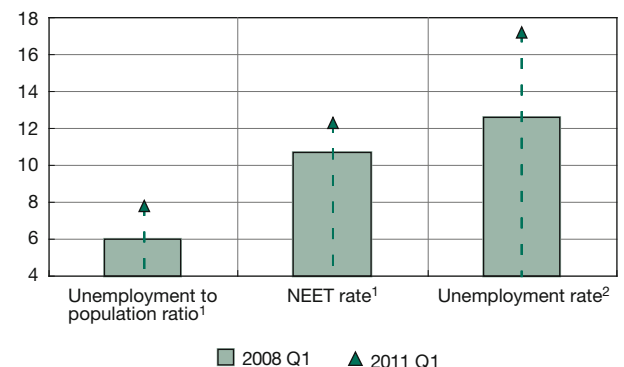
While some may have chosen to withdraw from the labour market and stay on in education because of the depressed labour market, for many young people inactivity is the result of discouragement and marginalisation, which tend to reflect the accumulation of multiple disadvantages, such as the lack of qualifications, health issues, poverty and other forms of social exclusion. Available evidence from longitudinal individual data for the United States and European countries also suggests that the NEET status can be very persistent for some young people, leading to a vicious circle whereby inactivity feeds into discouragement and that, in turn, to a further detachment from the labour market.⁵

OECD governments are increasingly concerned by the steep rise in youth unemployment and risk of exclusion from the labour market. A number of them have recently adopted comprehensive programmes to help all disadvantaged youth.⁶ As an example, with the number of NEETs exceeding 1 million, the UK government in late 2011 put forward a new policy strategy including additional support through more apprenticeships for young people and through a new Youth Contract. The new pro-

gramme will in particular help the most disengaged 16 and 17-year olds by assisting them to return to education, to acquire an apprenticeship or to obtain a job with training. In the Netherlands, the Investment in the Young Act introduced in October 2009 requires local authorities to offer a work/learning position to all young persons on benefits, i.e. support and assistance in returning to the education system or in finding work or possibly an apprenticeship. If a young person refuses the offer of support, then he/she loses the entitlement to benefits. Likewise, in France an emergency strategy was launched in the midst of the

Figure 3
Youth Joblessness Indicators During the Crisis, OECD Area

Percentages



¹ As a percentage of the youth population (persons aged 15/16-24).
² As a percentage of the youth labour force (persons aged 15/16-24).

Source: National labour force surveys.

5 G. Quintini, T. Manfredi: Going Separate Ways? School-to-Work Transitions in the United States and Europe, OECD Social, Employment and Migration Working Papers No. 90, 2009.
 6 OECD: Off to a Good Start?..., op. cit.

crisis to facilitate the school-to-work transition by promoting apprenticeship and combined work and training opportunities, fostering the transformation of internships into permanent employment contracts and providing additional training and employment opportunities for youth far removed from the labour market.

Job Quality Is an Issue for Many Young Workers

Beyond the standard divide between employment and unemployment, what matters for youth is access to productive and rewarding jobs that offer them good career prospects. This is an area where further progress is needed in many OECD countries, even in those that have managed to contain the increase in youth unemployment during the crisis.

Many youth jobs are temporary. The incidence of temporary employment among young workers aged 15/16-24 was 38% in 2010 on average in the OECD area, an increase of almost seven percentage points since 2000.⁷ The incidence of temporary contracts differs a lot across countries. At least half of all young workers have a temporary contract in Slovenia, Poland, Spain, Sweden, Portugal, France, Germany and Switzerland.⁸

The observed increase in the incidence of temporary jobs should not necessarily be regarded as negative in terms of the career prospects of those youth holding these jobs. For many youth, temporary contracts are more often a stepping stone to a permanent contract than a dead end.⁹ Among the nine European countries where data are available (United Kingdom, Ireland, Belgium, Luxembourg, France, Greece, Finland, Italy and Spain), the probability of youth getting a permanent job one year after working at a temporary job is higher than after being unemployed.¹⁰ This probability, however, is much higher for youth with tertiary education than for those with lower levels of education. Moreover, a high incidence of temporary employment is a key factor to explain the concentration of job losses among youth during the recent crisis. The first response of many firms facing a collapse in demand during the Great Recession was indeed to terminate their tem-

porary contracts or not renew them upon expiration. The extraordinarily high youth unemployment in Spain (48% in the third quarter of 2011) is associated not only with the depth and length of the economic crisis but also with the fact that more than 60% of youth were on temporary contracts before the crisis and many of these jobs were destroyed during the crisis.

But the quality of jobs for youth goes beyond the issue of contract duration and the prospect of renewal/conversion; it also includes hours worked and remuneration. The case of the Netherlands, a country able to maintain a relatively low youth unemployment rate during the crisis, is a good example in this respect. Salverda¹¹, for example, suggests that the much-praised fact that many Dutch youth combine education with work experience often hides the fact that many of them are working in tiny low-paid jobs for very few hours per week. He suggests that if the focus was instead on the full-time youth employment rate, the Dutch economy would differ little from a number of other European countries; full-time youth employment declined sharply in the Netherlands as in these other countries during the crisis.

Improving Educational Outcomes and Upgrading Youth Skills for Better Labour Market Outcomes

Tackling youth unemployment and under-employment or inactivity no doubt requires a comprehensive policy strategy that removes the different barriers in order to achieve productive and rewarding jobs. In this context, education and training policies play a key role in equipping youth with appropriate skills in a rapidly evolving labour market and thereby facilitating the transition from school to work. Success in converting skills into productive jobs largely depends on developing a better understanding of whether the right mix of skills is being taught and learned in equitable and efficient ways, whether economies and labour markets are able to fully utilise their skill potential and whether governments can build strong governance arrangements and effective coalitions with their social partners to find sustainable approaches to who should pay for what, when and where.

Education Matters for Better Labour Market Outcomes for Young People

It is recognised that higher educational attainment improves the labour market prospects of young people and

7 OECD: *Off to a Good Start?...*, op. cit.

8 In Germany and Switzerland, temporary contracts are mainly apprenticeship contracts.

9 See B. Cockx, M. Picchio: *Are Short-Lived Jobs Stepping Stones to Long-Lasting Jobs?*, IZA Discussion Papers No. 4007, Institute for the Study of Labor (IZA), 2009, who find that short-lived jobs (lasting less than one quarter and involuntarily ending in unemployment) tend to be stepping stones to long-lasting jobs (lasting more than one year) in Belgium for long-term unemployed school-leavers.

10 See Figure 5.8 in OECD: *Off to a Good Start?...*, op. cit. based on 2005-06 data from the European Survey on Income and Living Conditions (EU-SILC).

11 W. Salverda: *The Netherlands: Is the impact of the financial crisis on inequalities different from in the past?*, in: D. Vaughan-Whitehead (ed.): *Work Inequalities in the Crisis: Evidence from Europe*, ILO, 2011.

that a corollary of low educational attainment is marginalisation through unemployment/inactivity. Indeed, on average in the OECD area in 2009, low-skilled youth, who did not complete upper-secondary schooling, have an unemployment rate 1.8 times that of tertiary graduates (Figure 4). The risk is at least three times as high in seven OECD countries (Estonia, Finland, Norway, Switzerland, Sweden, the Czech Republic and the United States).

There are, however, six OECD countries (Chile, Greece, Italy, Mexico, Portugal and Turkey) where tertiary graduates have a higher risk of unemployment than low-skilled youth. In some of these countries, namely Chile, Mexico and Turkey, the higher incidence of open unemployment among skilled youth is related to the fact that they are the ones who can afford to search for a formal-sector job, while many unskilled youth are often employed in the informal sector where low-paid and precarious job opportunities abound. More generally, however, many skilled youth – upper-secondary or tertiary graduates – leave the education system unprepared for the labour market. This can result in high youth unemployment rates but also in large shares of youth working in fields unrelated to what they have studied. The latter is a major source of over-qualification, i.e. work in jobs that require lower qualifications than those they possess.¹²

Educational Policy Responses Need to Be Diversified

Major progress has been made in promoting universal access to primary and often lower-secondary education, but many young people still do not have access to, or drop out from, education before achieving an upper secondary qualification, which is considered a milestone for a smooth transition to work, participation in lifelong learning and career progression. Different policy actions are required in this context.

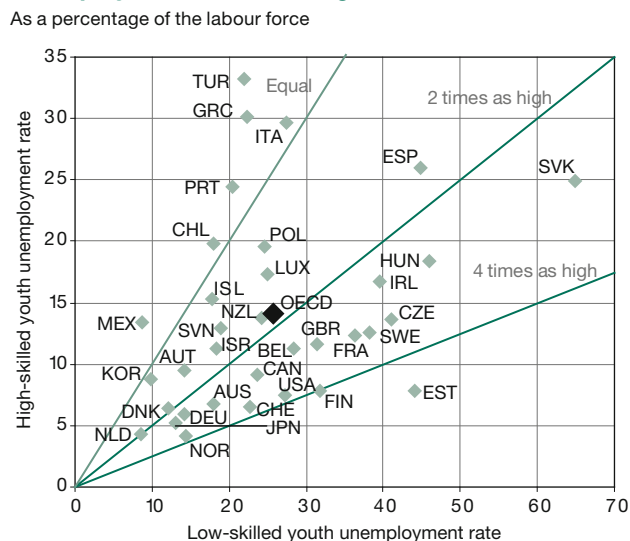
First, it is important to keep in mind that expansions of early childhood education, to cover either more children of a given age or younger children, are found to yield benefits at school entry, in adolescence and in adulthood.¹³ Generally, these gains are largest for those who are disadvantaged (e.g. those who come from low-income or immigrant households), especially if the investments are sustained through compulsory schooling.

Second, in OECD countries where enrolment in education through lower secondary education (i.e. up to age 15 or

¹² For more details, see OECD: Employment Outlook, OECD Publishing, Paris 2011.

¹³ C. Ruhm, J. Waldfogel: Long-Term Effects of Early Childhood Care and Education, IZA Discussion Paper No. 6149, Bonn 2011.

Figure 4
Low-Skilled Youth (15/16-24) Face a Much Higher Unemployment Risk than High-Skilled Youth, 2009¹
As a percentage of the labour force



Note: "Low-skilled" refers to lower than upper secondary education and "high-skilled" to tertiary education. For Japan, "low-skilled" refers to less than upper secondary education as well as upper secondary education.
¹ 2008 for Belgium.

Source: European Union Labour Force Survey and national labour force surveys.

16) is almost universal, the focus has been on improving retention in upper secondary education, in some cases by raising the age of compulsory participation in learning. Provided that it is accompanied by measures to diversify educational choices, in particular through apprenticeship and a focus on the acquisition of a recognised qualification that is valued by employers rather than simply spending more time in a classroom, measures to encourage longer stay at school have proven effective in ensuring youth leave education with a minimum skill level. Extending the schooling period could be achieved in different ways. Some countries have raised the school-leaving age. This is the case, for example, in the Netherlands, where since 2007 a law has required 18-year-olds who have not acquired a two-year diploma from the second cycle of secondary vocational education to follow a work-study programme. In England also, the Education and Skills Bill requires a flexible participation in education and training for young people until they are aged 18 or until an upper secondary qualification is obtained, whichever is earlier. In 2006, the province of Ontario in Canada raised the age of compulsory learning from 16 to 18 and provided a range of positive incentives to stay on in schooling and to achieve a qualification in its Student Success Strategy.

Finally, policies to raise educational attainment are directed at those groups of young people among whom rates

of school completion are currently low — people living in disadvantaged and remote areas and those from particular contexts, such as immigration or ethnic backgrounds. For youth who have disengaged from academic education, dual schooling systems, combining class-based learning with work-based apprenticeships, have received significant attention. This is partly because of the good performance in terms of low youth unemployment in countries with a long tradition of apprenticeship systems — notably Austria, Denmark, Germany and Switzerland. In particular in Germany, roughly two-thirds of people under the age of 22 choose to enter apprenticeships where, along with related technical instruction at a vocational school, they learn on-the-job the skills required for a given occupation. For Zimmerman¹⁴, apprenticeships instil employable skills as well as provide a transition to a young person's first job. A number of OECD countries have introduced specific measures to support apprentices in the context of the recent economic crisis.¹⁵

Developing Labour Market Skills in a Broader Strategy

Measures to improve the labour market skills of youth should be seen as part of a broader strategy to promote cost-effective skill development policies and measures which foster deeper investments in human capital and a strengthening of the links between learning and the skills requirements of the labour market.

High-quality career guidance can help youth make better informed decisions about their future skills but requires early action in lower secondary education, highly qualified guidance personnel and timely and high-quality data on local labour market needs and employment prospects by occupation. Unfortunately, most existing career guidance programmes suffer from severe under-funding, are provided by teachers who lack familiarity with workplace requirements, and cannot rely on accurate labour market and skill statistics and projections by region and occupation.

A number of policy initiatives have also been directed to develop “soft” skills such as literacy and competencies to improve the ability of young people to navigate the changing world of work successfully. They are important to young people's resilience and focus on emotional and social dimensions as well as problem-solving abilities and creativity. In Australia, the need for such skills is recognised via the National Foundation Skills Strategy for Adults, the federal budget and some state policies, and

14 K.F. Zimmerman: Job Strategies for the Young, IZA Compact, October 2011.

15 See OECD: Off to a Good Start?, op. cit., for a review.

through the work of universities, vocational education and training (VET) providers and not-for-profit organisations.¹⁶

Finally, the combination of work and study would also help youth acquire some of the skills required in the labour market before they leave the education system. To encourage the acquisition of work experience, internships have expanded recently in a number of countries. But according to a survey by the European Youth Forum¹⁷, the quality of internships is not often secured. Another concern is that internships are mainly available to those with access to external financial resources, in particular from their families. This means that families and young people already on the margins of society will lose out, and as a result, the gap between privileged and non-privileged students and labour market entrants could widen. Some guidelines have started to emerge to prevent abuses and ensure that internships are true learning experiences for students rather than a cheap form of labour for employers. Several countries have introduced a number of requirements. France in particular requests that internship agreements can only be entered into with students, i.e. an agreement is required between the education establishment and the employer, and interns are paid a moderate wage, at least when the internship lasts beyond a certain length.¹⁸

Well-Designed and Closely Co-ordinated Policies Dealing with Education, Labour Market and Social Protection Are Necessary

While leaving education with the skills required by employers and needed for lifelong-learning is important to facilitate the transition to work, labour market policies and institutions can play a major role in helping youth to get off to a good start.¹⁹

In particular labour market policies such as unemployment benefits and active labour market programmes can assist the job search by providing adequate income support combined with effective employment services. In recent years, access to safety nets in OECD economies has been made increasingly conditional on an active job search following the “mutual obligations” principle, whereby income support for the unemployed is combined with strict job search requirements and compulsory participa-

16 L. Robinson, M. Long, S. Lamb: How Young People are Faring, Centre for Research on Education Systems, University of Melbourne, 2011.

17 European Youth Forum: Interns revealed, Brussels 2011.

18 OECD: Jobs for Youth: France, OECD Publishing, Paris 2009.

19 See OECD: Off to a Good Start?, op. cit. for a more in-depth analysis of the cost-effective measures to tackle the large rise in youth joblessness.

tion in effective re-employment programmes under the threat of moderate benefit sanctions in the event of non-compliance. Job search assistance programmes are often the best way to help youth who are assessed as job-ready. Training programmes work best when they are carefully tailored to local or national labour market needs.²⁰ Because action is needed on multiple fronts, several OECD countries are strengthening the support they provide to unemployed and disconnected youth by setting up comprehensive programmes that include classroom instruction, on-the-job training and adult mentoring. Finally, to be successful, hiring subsidies need to be targeted at the most disadvantaged – e.g. low-skilled youth – and at employers who are expanding their workforce.

At the same time, while labour market institutional settings can play an important role in preventing the exploitation of youth in low-paid, precarious jobs, an appropriate balance must be found to ensure these institutions support rather than hinder the creation of productive jobs for youth²¹, and social dialogue can facilitate striking the appropriate balance.²²

One challenge is that of reducing the cost of employing low-skilled youth. Almost half of the OECD countries with a statutory minimum wage (ten out of 21) have an age-related sub-minimum wage to facilitate the access of low-skilled youth to employment. Others have significantly reduced the social security contributions paid by

20 See e.g. J.P. Martin, D. Grubb: What Works and for Whom? A Review of OECD Countries' Experience with Active Labour Market Policies, in: Swedish Economic Policy Review, Vol. 8, No. 2, 2001.

21 J.P. Martin, S. Scarpetta: Setting It Right: Employment Protection, Labour Reallocation and Productivity, *De Economist*, November 2011.

22 According to European Industrial Relations Observatory – EIRO: Helping young workers during the crisis: contributions by social partners and public authorities, Dublin 2011, both trade unions and employers' organisations recognise the particular difficulties facing young workers; they also mostly agree on some policy measures, such as developing apprenticeships and reforming education systems.

Ilias Livanos and Imanol Núñez

Young Workers' Employability and Higher Education in Europe in the Aftermath of the Financial Crisis: An Initial Assessment

The Europe 2020 Strategy, designed by the European Commission, considers the use of graduate employment data as key in designing, delivering and evaluating higher education courses. The need for rapid reaction and adaptation to the challenges taking place in Europe since 2008 makes such information as important as ever. The present study makes

employers for low-paid workers. Another option would be to promote apprenticeship contracts for low-skilled youth, where the apprenticeship wage is lower than the minimum wage because it implies a training commitment on the part of the employer. Another challenge is how to promote a smooth transition for youth from entry jobs to more stable and productive ones. In those countries with large differences in the stringency of regulations for temporary (or other atypical job) contracts as compared with permanent ones, many youth tend to be trapped into precarious jobs that do not offer clear career prospects for a long period. While reducing the differences in the provisions associated with different types of contracts would have positive effects for many low-skilled workers and those with intermittent employment spells, youth are likely to be among the main beneficiaries. There should be a rebalancing of employment protection so as to promote a process whereby youth (as well as other workers with limited work experience) can gradually move from entry jobs into jobs that offer good career prospects.

Conclusions

There is no doubt that fostering youth employability requires a comprehensive and forward-looking skill strategy; this is more urgent today as the global economic crisis has hit youth hard and many of them are still facing significant barriers to employment. But it has also become clear that efforts to achieve a better match between the skills youth acquire at school and those needed in the labour market may not per se be sufficient to improve labour market prospects for all youth. These efforts must be complemented by economic and social policies to promote the stronger and sustainable growth of quality jobs. In the still hesitant economic recovery from the Great Recession and despite the often severe constraints on public finances, it is important to support robust training efforts in growth strategies while providing better support and access to employment services and social protection to disadvantaged youth.

an initial assessment of the impact of the economic crisis on graduates' employability. Using a large sample from young workers in Europe, this paper estimates unemployment rates by level of education and field of study and compares their level before and after the crisis across countries. Differences in gender are also considered.

Young people (defined as those below 35) face more difficulties than older workers in securing stable and well-paid employment. Temporariness, spells in unemployment and generally poor working conditions are commonly encountered in the early stages of a professional career. Furthermore, work opportunities for young people in Europe have been badly hit by the economic and financial crisis of 2008-09. In most EU countries unemployment levels among young workers are not only significantly higher than those for other age groups, but they have also risen at a faster pace. Furthermore, higher education, which has traditionally been seen as a safety net against unemployment and adverse employment conditions, can no longer be seen as such, mainly due to the dramatic increase in the supply of graduates over the last few decades.

Variation in the types of higher education, as expressed by the different fields of study, affects graduates' employment conditions to a certain extent.¹ In general, strong divergences exist among graduates from different disciplines. Those which relate to the changing patterns of demand – such as computing, engineering, education and health and welfare – enjoy the best employment prospects. On the other hand, the prospects are relatively poor for graduates from disciplines with lower levels of labour market application, such as humanities and the arts. Moreover, some subjects – such as education, engineering, health and welfare, and services and tourism – are more effective at avoiding short-term unemployment spells. Others, instead, are particularly effective at preventing long-term unemployment. Such disciplines include sciences, biology and environment, computer use and health and welfare.

Nevertheless, no studies have so far investigated how different levels of education and various fields of study have been affected by the recent economic crisis. In order to assess this, this article examines the unemployment rates associated with different educational levels and fields of study for young people (under 35) in the EU15 before (2007) and immediately after (2009) the economic crisis. This preliminary investigation can aid our understanding of the vulnerability of higher education and certain fields of graduate study to downturns in the economic cycle.

Higher Education and the Labour Market

It can be inferred from economic theory that an inverse relationship between education and unemployment exists

¹ See I. Núñez, I. Livanos: Higher Education and Unemployment in Europe: an Analysis of Academic Subjects and National Effects, in: Higher Education, Vol. 59, No. 4, 2010, pp. 475-487.

in most developed countries. The fact that individuals with higher levels of education experience lower levels of unemployment has been well established. This has led to the general notion that as one's level of education increases, the probability of unemployment decreases. However, even though additional education is generally related to better performance in the labour market, there are cases where the increase in supply has outpaced demand. In such cases the labour market situation for graduates has been affected negatively.

During the last few decades, higher education systems across Europe have undergone a process of rapid and sharp transformation. Access to higher education has increased significantly, expanding the supply of graduates and producing an unprecedented number of high-skilled workers. As a result, the intense level of competition among graduates has exerted downward pressures on labour market returns. Arguably, employers have changed their expectations of graduates, and academic degrees are now regarded as a "pre-requisite" rather than as a positive signal of upgraded skills and capabilities. In many instances, graduates are recruited in occupations, such as administrative or technical jobs, that traditionally did not require higher education skills. Such phenomena are leading to over-education as well as other problems for graduates, such as job insecurity, contractual precariousness and low wages. The key point of the above is that we may no longer be able to take low rates of unemployment for graduates for granted.

However, employment perspectives for graduates are far from being homogeneous across countries and fields of study. Strong country differences exist for various aspects of the transition to employment, such as the timing, method and length of the job search. These differences result in diverse outcomes in terms of unemployment, job stability, working time and job satisfaction. Regarding country variation, graduates in Mediterranean countries (i.e. Spain, Italy, Portugal and Greece) seem to be more vulnerable in their labour markets than graduates in the remaining European countries (i.e. Continental, Nordic and Anglo-Saxon countries).

The European higher education sphere has traditionally been rather nationally focused, with distinctive institutional and operational differences. This heterogeneity can, to a certain extent, explain differences in the employment prospects of graduates. Also significant is the variation of employment prospects across different fields of study. In particular, there is a rising mismatch between the demand for and the supply of some specific types of degrees, which creates various imbalances in the graduate labour market in Europe.

The need for comparative analysis across Europe is as important as ever. The Bologna work programme 2007-2009² acknowledges the issue of country and subject heterogeneity and considers graduates' employability to be a high priority. The European Commission's 2020 Strategy puts forth the higher education modernisation agenda and focuses on enhancing mobility across member states.³ Thus, knowledge of the transitions to the labour market by graduates of different disciplines across countries can provide useful guidance.

Education and Unemployment: Drawing the Picture of Europe

Data and Sample

This article makes use of micro-data from the yearly European Labour Force Survey (EU-LFS) in order to examine the labour market situation of graduates of different fields across the EU15. The LFS is a household sample survey that is designed to obtain labour market information about individuals. It is conducted on a quarterly basis in all EU member states. The sample of the survey varies across countries. To capture how graduates' employability has been affected by the recent economic crisis, data for the year before the crisis (2007) and immediately following the crisis (2009) were chosen. Thus, we estimate unemployment rates broken down by level of education and higher education discipline across EU15 member states for the two years in question; we also break down the results by gender.

Such an investigation had been hindered up until now by the absence of common definitions of levels and types of higher education. In the EU-LFS, the definitions of levels of education and academic fields are harmonised, based on UNESCO's (2006) International Standard Classification of Education (ISCED). The ISCED was first designed by UNESCO in the early 1970s to serve as an "instrument suitable for assembling, compiling and presenting statistics of education both within individual countries and internationally."⁴ This classification has been adopted by the EU-LFS, building a harmonised database of educational levels and academic fields. The harmonisation of educational levels and types of education largely overcomes the comparability problem that has limited most studies.

The highest level of education obtained by the individual is captured using the EU-LFS classification of low (ISCED1

2 See Bologna Work Programme 2007-2009, Bologna Follow up Group, Lisbon 2007.

3 See Europe 2020: A strategy for smart, sustainable and inclusive growth, European Commission, Brussels 2010.

4 UNESCO: International Standard Classification of Education, Paris, July 1975, p. 1.

Table 1
EU15 Unemployment Rates for Young Individuals (16-35)

Education level	Before (2007)	After (2009)	% Change
Total			
High education	7.11%	8.73%	+22.7%
Medium education	9.30%	13.00%	+39.7%
Low education	15.42%	21.02%	+26.6%
Males			
High education	6.16%	8.68%	+29.0%
Medium education	7.79%	12.80%	+64.3%
Low education	13.14%	20.00%	+52.6%
Females			
High education	7.82%	8.78%	+10.9%
Medium education	11.10%	13.20%	+20.0%
Low education	19.30%	22.70%	+17.6%

Source: Compiled by the authors based on the EU-LFS.

and ISCED2), medium (ISCED3 and ISCED4) and high (ISCED5 and ISCED6) levels of education.⁵ The high education category includes all tertiary education (e.g. undergraduate, post-graduate, PhD degree). Regarding the field of study, the EU-LFS distinguishes 11 different subject groups. These are: 1) Education Science; 2) Humanities and Arts; 3) Foreign Languages; 4) Social Sciences, Business and Law; 5) Physics, Chemistry and Biology; 6) Mathematics and Statistics; 7) Computer Science; 8) Engineering; 9) Agriculture and Veterinary; 10) Health and Welfare; and 11) Services and Tourism.

Education Level and Gender

Using the sample described above, we analyse young people's employability in Europe before (2007) and just after (2009) the economic crisis, with particular interest in differences across education levels and fields. Table 1 shows unemployment rates by education level and gender for the aggregate EU15 level.

The unemployment rates shown in Table 1 clearly suggest that the 2008 economic crisis severely affected the employment perspectives of all young individuals regardless of their education level. Nevertheless, unemployment rose more dramatically for low- and medium-educated individuals than for highly educated ones. This has widened the "employability gap" between graduates and non-graduates. For instance, while unemployment in 2007 was 7.1% for the highly

5 For a full description of the LFS data see: European Commission : Labour Force Survey: Anonymised Datasets, Eurostat, Social Statistics and Information Society, 2006.

educated and 15.4% for the low educated, these levels rose to 8.7% and 21% respectively in 2009. Furthermore, while the unemployment rate for graduates rose 22.7% in two years, the rate for medium- and low-educated individuals escalated 39.7% and 26.6% respectively.

On the one hand, this suggests that graduates were the least affected by the economic crisis in terms of unemployment. On the other hand, however, this may indicate that some jobs traditionally performed by the medium educated, such as administrative or technical jobs, may have been taken by graduates. These lower-skilled jobs could act as a substitute for the more expensive contracts traditionally offered to graduates, which in turn negatively affects the employment situation of medium- and low-educated workers. Consequently, if highly educated workers are now involved in low-skilled activities, the problem of over-education may have intensified. Further research in this direction is urgently needed in order to adequately address the demand for workers and skills.

Table 1 also shows that the economic crisis has not equally affected male and female individuals. As expected, unemployment increased for both males and females, but the impact was greater for men. Accordingly, the gender unemployment difference has narrowed, at least in terms of avoiding unemployment. Gender differences have been particularly reduced for the high and medium education segments, where unemployment rates in 2009 were practically equal for males and females. This trend may be explained by the strong employment losses suffered in some typically masculine fields, such as construction or industrial manufacturing, particularly in the early stages of the crisis. Moreover, the increase in flexible labour market patterns during the crisis may have favoured female employment, reducing the deterioration of their employment situation. On the other hand, one cannot rule out the possibility that females may have chosen to exit the labour market and focus more on family commitments.

Education Level and Country

Table 2 depicts the very heterogeneous picture of unemployment across European countries. In general, the risk of unemployment grew significantly between 2007 and 2009 in all countries. However, the worsening of labour market conditions for graduates is not equal in all countries. Interestingly, the estimated rates show that the crisis hit strongly in countries where unemployment was relatively low. In the UK, Denmark and Ireland, technically full employment for graduates was reached in 2008, but in 2009 unemployment rates rose to 5.26% in the United Kingdom (from 2.78% in 2007), to 7.13% in Denmark (from 4.66% in 2007) and to 9.23% in Ireland (from 3.03% in 2007). Graduates in these

Table 2
Unemployment Rates by Country and Education Level

	High education		Medium education		Low education	
	2007	2009	2007	2009	2007	2009
Austria	3.12%	3.36%	4.43%	5.31%	10.90%	12.80%
Belgium	5.82%	6.81%	12.00%	13.00%	25.00%	26.20%
Germany	3.34%	3.83%	7.90%	7.73%	17.40%	14.90%
Denmark	4.66%	7.13%	4.51%	9.58%	7.66%	12.60%
Spain	7.93%	14.30%	11.00%	21.70%	14.30%	33.80%
Finland	3.30%	4.79%	8.84%	12.23%	20.80%	28.70%
France	7.48%	8.03%	12.70%	15.80%	25.90%	30.30%
Greece	14.7%	15.50%	15.10%	16.50%	12.70%	15.50%
Ireland	3.03%	9.23%	6.09%	18.50%	14.20%	33.20%
Italy	11.20%	13.40%	10.90%	13.70%	14.30%	17.30%
Luxembourg	6.56%	5.70%	6.00%	6.86%	14.10%	13.70%
Netherlands	1.45%	2.85%	3.03%	4.33%	8.31%	9.31%
Portugal	13.60%	11.90%	10.20%	15.50%	12.20%	13.00%
Sweden	4.77%	5.44%	7.65%	11.80%	23.8%	30.50%
UK	2.78%	5.26%	7.89%	11.90%	18.40%	24.40%

Source: Compiled by the authors based on the EU-LFS.

countries, especially in the UK and Ireland, may have been particularly affected by the first wave of the 2008 crisis as many investment banking and financial intermediation companies suffered big job losses.

Less surprisingly, unemployment rates also soared in countries where unemployment has traditionally been higher. Mediterranean countries, such as Greece, Italy, and in particular Spain, suffered strong increases in unemployment rates at all levels. In these countries, the increase in unemployment was more intense among those with medium and low levels of education, whose unemployment rates reached very worrying levels. Despite the loss of jobs in the graduate labour markets of these countries, the higher education segment performed better than the medium and low education segments.

The impact of the crisis on unemployment in the rest of the European countries was not that strong. In Germany, for example, employment perspectives for the low and medium educated improved, while the perspectives for the highly educated remained practically unaltered. This does not come as a surprise, as Germany has been only marginally affected by the economic crisis compared to other countries. The case in Luxembourg has been more or less similar. In countries such as France, Sweden, Belgium and Austria, unemployment rates lessened quite moderately. However, in all of these countries, the impact of the crisis

was stronger on the medium and low education segments than it was for the EU as a whole.

In general, the economic crisis widened the gap in the European labour market. In particular, the already high levels of unemployment in 2007 were followed by further increases in 2009. Regarding higher education, the value of being a graduate clearly varies from one country to the next. Using corner cases such as Portugal or Italy as examples, unemployment among graduates is practically as high as it is for medium and low educated individuals. High education therefore is not very effective in providing protection against unemployment in these countries. On the other hand, in countries such as Sweden, the UK, Germany or France, the unemployment rate of the low educated is up to six times (i.e. in Sweden) higher than for the highly educated. A quick glance at any index on the quality of universities and higher education makes visible the relationship between the value of degrees and their positive effect against unemployment.

Academic Fields

Table 3 shows the distribution of graduates across academic fields alongside unemployment rates for each category. The EU-LFS classification of academic fields includes three large categories such as Social Sciences, Business and Law (36.2%), Engineering (11.3%) and Health and Welfare (11.3%) that account for the majority of all graduates. This is an important shortcoming to the analysis, as a great deal of variation within these broad categories is uncontrolled. For example, within the largest category (Social Sciences, Business and Law), the employment perspectives of Law graduates, whose labour market is usually tightly regulated, and Business graduates, whose employment is more flexible, could differ significantly.

The distribution of graduates across academic fields in Europe remained quite stable between 2007 and 2009. In general, there is a moderate rise in the number of graduates in all academic fields in our sample. This growth is not equal for all fields, and accordingly the weights of some fields increase at the expense of the decrease of some others. In particular, the share of the largest academic field, Social Sciences, Business and Law, increased by 2.3 percentage points, absorbing chiefly graduates from Humanities and Arts as well as from Education Science, whose shares shrank by 1.3 and 0.6 percentage points respectively. The shares of the remaining academic fields, including the more technically specific ones (i.e. Engineering or Health and Welfare), remained stable.

As expected, unemployment rates vary greatly across academic fields, although a common trend is that rates are higher in 2009 than in 2007. The lowest rate in 2007 was

Table 3
Labour Market Participation and Unemployment Rate by Academic Field

Academic field	Number of young active graduates in the sample		Unemployment rate	
	Before (2007)	After (2009)	Before (2007)	After (2009)
Education Science	900 [7.38%]	1,053 [6.70%]	9.82%	9.64%
Humanities & Arts	1,410 [11.5%]	1,613 [10.2%]	15.1%	14.5%
Foreign Languages	450 [3.69%]	494 [3.15%]	10.0%	11.1%
Social Sciences, Business & Law	4,141 [33.9%]	5,699 [36.2%]	10.5%	10.7%
Physics, Chemistry & Biology	978 [8.02%]	1,188 [7.56%]	14.3%	7.23%
Mathematics & Statistics	187 [1.53%]	209 [1.33%]	7.04%	7.87%
Computer Sciences	432 [3.54%]	526 [3.35%]	7.93%	11.0%
Engineering	1,475 [12.1%]	1,931 [12.2%]	11.1%	12.4%
Agriculture & Veterinary	178 [1.46%]	237 [1.51%]	11.1%	9.90%
Health & Welfare	1,364 [11.1%]	1,776 [11.3%]	4.12%	5.80%
Services & Tourism	317 [2.60%]	466 [2.97%]	10.1%	15.4%
General Programs	40 [0.33%]	78 [0.50%]	13.0%	14.6%

Note: The column percentages do not add up to 100% since the category "other" is not included in the table.

Source: Compiled by the authors based on the EU-LFS.

for Health and Welfare (4.12%), and the highest was for Humanities and Arts (15.1%). However, no clear relationship exists between the level of unemployment in 2007 and the supply of graduates in 2009. For example, the high unemployment rates in Social Sciences, Business and Law (10.5%), Agriculture and Veterinary (11.1%) and Services and Tourism (10.1%) were followed by increases in the shares of such graduates in 2009. The lack of a strong relationship between high unemployment and the supply of graduates suggests that graduates' decisions regarding their academic field do not perfectly anticipate their future labour market perspectives, particularly when economic conditions change so rapidly. This may create some labour market frictions, causing unemployment to grow more considerably in some fields than in others. The experience in the Service and Tourism field illustrates this: in 2007, unemployment among graduates of this academic field was 10.1%, but despite being one of the fields with the highest levels of unemployment, the share of graduates actually in-

creased in 2009. As a result, the unemployment rate for this field soared to 15.4% in 2009.

The change in unemployment rates between the two years is in accordance with other evidence on the impact of the 2008 crisis. According to the European Commission⁶, in the early years of the crisis the most affected sectors were finance and banking alongside some industries based on private consumption. Our figures show that the greatest increases in unemployment were concentrated in Computer Sciences (3.7%), a field strongly associated with financial intermediation, and Services and Tourism (5.3%), which is linked to private consumption. Conversely, fields associated with public employment, such as Education Sciences or Humanities and Arts, experienced marginal increases in unemployment. However, this situation may have changed in the ensuing years, as public expenditure cuts have strongly affected employment in these sectors.

Discussion and Policy Implications

The Europe 2020 strategy states that higher education plays “a crucial role in individual and societal advancement and in providing the highly skilled human capital and the articulate citizens that Europe needs to create jobs, economic growth and prosperity.”⁷ Some very optimistic perspectives for higher education employment are made in that report, as it is predicted that by 2020, 35% of all jobs in the EU will require high-level qualifications. According to this forecast, the European labour market will be soon transformed into a highly skilled, highly competitive source of human capital. However, such an optimistic perspective is in conflict with the growing concern regarding the increased unemployment figures among European graduates.

In this uncertain situation, the analysis we present in this contribution shows that labour market conditions have worsened for the highly educated. Nevertheless, such deterioration has been stronger for the low- and medium-educated young workers, which serves to suggest that graduates were the least affected by the current economic crisis. However, the preliminary evidence presented in this contribution suggests that the long-lasting skills mismatch problem that has affected European economies due to the expansion of higher education has actually intensified. In particular, the destruction of some highly qualified jobs, such as in the Computer Science area, may have led graduates towards less qualified jobs, pushing medium- and low-qualified workers to unemployment.

⁶ See European Commission: Supporting growth and jobs-an agenda for modernisation of Europe's higher education system, European Commission, SEC 2011, 1063 final, Brussels, Belgium 2011.

⁷ European Commission, op. cit., p. 2.

Our analysis also shows that unemployment rates are not homogeneously distributed across European countries. In order to reduce the strong geographical disparities, European nations have created the European Higher Education Area. This effort at integration aims to reinforce mobility and cooperation and, consequently, help in reducing unemployment in countries such as Spain, Portugal and Greece. Indeed, recent figures provided by the Spanish Department of Labour indicate that the number of graduates leaving the country to find a job doubled in 2011. The case is similar in Greece and Italy. However, this potentially beneficial mobility has a clear drawback that has been pointed out by the European Commission. In particular, there is a risk of a massive exodus of high-skilled workers from countries where unemployment is high to countries where jobs are available. This ongoing migration trend serves as a “brain drain” on countries where investment in R&D is low, concentrating the highly skilled and talented in the more developed countries of Europe. If this migratory trend grows, it may harm the economic growth of countries losing graduates, increasing disparities among European countries.

In this sense, it is very important to note that the convergence of higher education systems is not only intended to make the European labour market more flexible and mobile. It is also aimed at improving the quality and reliability of some higher education systems that are failing to provide the necessary employability to their graduates. For instance, this could be done by improving university networks aiming to provide joint courses. Another example is the Erasmus Mundi initiative led by the European Commission, which has strongly contributed to the sharing and transferring of knowledge and resources across the European higher education systems by moving more than 1.5 million students and academics in the last decade. Through initiatives of this type, the European area may benefit from an overall improvement in educational quality and increased harmonisation.

Our analysis also shows that males have been more affected by the crisis than female graduates. The Higher Education Policy Institute (HEPI) also observed a more rapid increase in unemployment among male graduates; however, according to their report, males still appear to be working in better quality jobs, as measured by salary and other metrics.⁸ This evidence suggests that male graduates may be more vulnerable to economic downturns, as female graduates are more used to accepting poorer employment conditions and it may therefore be easier for them to adapt to new (worsened) labour market conditions.

⁸ J. Thompson, B. Bekhradnia: Male and female participation and progression in Higher Education: further analysis, Higher Education Policy Institute Report, 2010.

The distribution of unemployment rates by academic field clearly shows that the supply of graduates does not adjust perfectly to the labour market's needs and changes. First of all, differences in unemployment rates between various fields are as large as 10%. Second, the number of graduates in some fields that have been particularly troubled by unemployment continues to grow (e.g. Social Sciences, Business and Law or Services and Tourism), while enrolment in fields where unemployment is lower (Health and Welfare, Mathematics and Statistics or Physics, Chemistry and Biology) still remains at low levels. To enhance flexibility and labour market mobility across fields, higher education institutions could encourage new transversal and multidisciplinary programs. In this line, the European Commission recommends member states to "encourage a greater variety of study modes (e.g. part-time, distance and modular learning, continuing education for adult returners and others already in the labour market)".⁹

In order to provide solutions to the issues discussed above, the European Commission has developed a strategy advocating the following policies.¹⁰ The first policy is to promote a diversity of higher education institutions in order to attract a broader cross-section of society into higher education. In particular, higher education institutions should be able to provide assistance to disadvantaged and vulnerable groups, such as young unemployed workers. The sec-

⁹ European Commission, op. cit., p. 6.

¹⁰ European Commission, op. cit.

ond policy aims to strengthen quality through mobility and cross-border co-operation. This may be achieved by eliminating unnecessary administrative barriers, ensuring the efficient recognition of credits gained abroad and facilitating the issuing of Schengen visas to students and researchers undertaking short stays. The third policy aims to link higher education and research with business for excellence and regional development. In particular, the strategy proposes stimulating entrepreneurial, creative and innovative skills and encouraging cooperation with business and administration.

This contribution is a very initial assessment of the impact of the current financial and employment crisis in Europe. The positive message that one may take from our analysis is that graduates seem to be the least affected by the economic crisis in comparison with individuals with lower levels of education, thus reinforcing education's status as a "safety net" against adverse economic phenomena. However, the evolution of the crisis, from its beginnings as a financial crisis in 2008 to the sovereign debt crisis of 2011, is yielding many different consequences that are impossible to predict. Public employment, for example, has been significantly reduced during the last two years. As a result, graduates from some academic fields which were practically unaffected in 2009, such as Education Science or Health and Welfare, may suffer the impact of the crisis in a delayed manner. There are new and challenging avenues for research that should be able to assess new problems and provide new solutions.

W. Craig Riddell and Xueda Song*

Does Education Reduce Unemployment? New Evidence on the Impact of Education on Unemployment and Re-employment

The labour markets in the USA, Canada and many European countries have been characterised by dramatic structural changes in recent decades, partly due to technological change, globalisation and the shifting economic environment. In addition to these ongoing sources of adjustment, high unemployment and weak economic activity remain in many countries as they slowly recover from the "Great Recession" of 2008-09. In this environment, workers' adaptability to changing circumstances has become increasingly important for both individuals' labour market success and

the efficiency of the overall labour market. Whether displaced or unemployed workers are able to adjust efficiently to adverse employment shocks is critical to not only their own welfare but also to the maintenance of healthy communities and the efficient allocation of labour resources.

Motivated by the issue of whether additional education improves the ability of the labour force to adjust to economic shocks, we have been conducting research on the impact of formal education on transitions between labour force states, especially the transition from unemployment to employment. This article synthesises our recent findings on the causal effects of education on unemployment incidence, job search intensity and re-employment success based on

* The authors thank the Canadian Labour Market and Skills Research Network (CLSRN) and the Social Science and Humanities Research Council for financial support.

data from the USA and Canada.¹ We find that education at both the secondary and post-secondary levels increases the probability of re-employment among the unemployed. The magnitude of this effect is substantial. Further, our research suggests that education increases job search intensity, which may help illuminate a mechanism through which education influences the probability of re-employment. Finally, we find some evidence of a causal linkage between education and unemployment incidence (the probability of job loss). Additional education at the post-secondary level reduces the likelihood of becoming unemployed, although the size of this effect is relatively modest. However, education at the secondary school level does not appear to influence the likelihood of becoming unemployed.

Previous research has shown that education has a substantial impact on labour market outcomes such as earnings and employment as well as non-market outcomes such as health, longevity, civic participation and criminal activity.² The purpose of our research is to investigate the causal effects of education on individuals' adaptability to employment shocks. The view that education enhances adaptability has a long history. Early contributors to human capital theory regarded formal schooling (and work experience) as mechanisms that would enhance individuals' ability to make efficient decisions in the face of changing circumstances. Schultz surveys this literature – much of it based on studies of the agricultural sector – and concludes that additional education and experience lead to more efficient decision making by consumers, households and workers, and in particular to more rapid adjustment to changes in economic opportunities.³

Causality versus Correlation

Several previous studies have found that educational attainment is negatively correlated with the incidence of unemployment and positively correlated with re-employment rates among unemployed job seekers. The correlations between education and unemployment outcomes found in previous studies, however, do not necessarily represent true causal effects of education.

In particular, the positive associations between education and job search intensity or re-employment success could arise because of unobserved factors that are correlated with both variables. For example, those with more innate ability may acquire more education and thus may more readily adapt to changing circumstances. Similarly, individuals from advantaged backgrounds are likely to acquire more schooling and to enjoy better employment opportunities from well-connected social networks. Therefore, positive correlations between education and job search intensity or the probability of re-employment based on simple multivariate regression methods such as ordinary least squares (OLS) may overestimate the effects of education and fail to reveal the true causal link between education and labour market outcomes.

To address these statistical and econometric challenges, we employ an instrumental variables (IV) strategy to identify the causal relationships between education and unemployment, job search and re-employment outcomes. In this context, an instrumental variable refers to a variable that exerts an influence on educational attainment but is not correlated with unobserved factors such as innate ability that may result in a spurious correlation between education and unemployment. Specifically, we make use of historical changes in compulsory schooling laws and child labour laws as well as conscription risk in the Vietnam War period to create the instruments for schooling in analyses based on US data, and we make use of compulsory schooling laws to create the instruments for schooling in analyses based on Canadian data.

Because of the importance of the IV methodology to our results, we provide a brief intuitive explanation of this statistical approach. Compulsory schooling laws regulate school attendance requirements such as the maximum age of school entry and the minimum school leaving age. Child labour laws similarly regulate the work activity of children, especially those of young ages. In Canada these laws vary by province and in the USA by state. They have also evolved substantially over time in both countries. Much previous research has demonstrated that changes in these laws over time within provinces and states, as well as differences in these laws across provinces and states, have led to changes in educational attainment. Of course, these laws do not influence schooling decisions of all students. For example, the minimum school leaving age does not influence the educational attainment of those who would remain in school beyond the school leaving age in the absence of such laws, such as those who would finish secondary school and those who would attend post-secondary educational institutions. However, among those who would leave school at, for example, 14 years of age in the absence of such laws, a minimum school leaving age of 15 results in these individu-

1 This article is based on W.C. Riddell, X. Song: The Impact of Education on Unemployment Incidence and Re-employment Success: Evidence from the U.S. Labour Market, in: *Labour Economics*, Vol. 18, No. 4, August 2011, pp. 453-463; and on W.C. Riddell, X. Song: Education, Job Search and Re-employment Outcomes among the Unemployed, IZA DP No. 6134, November 2011.

2 See P. Oreopoulos, K. Salvanes: Priceless: The Nonpecuniary Benefits of Schooling, in: *Journal of Economic Perspectives*, Vol. 25, No. 1, Winter 2011, pp. 159-184 for a recent survey of this literature.

3 T. Schultz: The Value of the Ability to Deal with Disequilibria, in: *Journal of Economic Literature*, Vol. 13, No. 3, 1975, pp. 827-846.

als receiving at least an additional year of education beyond what they would otherwise have obtained. The key assumption of the IV methodology is that this additional education brought about by changes in compulsory schooling laws is independent of unobserved factors such as innate ability or motivation that might be correlated with both education and unemployment outcomes later in life. The other important point to note is that changes in compulsory schooling laws will primarily influence education decisions at the secondary schooling level.

In our research with US data we also use conscription risk during the Vietnam War era as an instrumental variable for education. Throughout most of the Vietnam War, males could enrol in college to obtain deferments that delayed their eligibility for conscription (the “draft”) into the Armed Services. Card and Lemieux find evidence that conscription risk varied significantly across birth year cohorts, due to differences in military manpower requirements and cohort size.⁴ By comparing college attainment of males with that of females from the same cohort, they find that draft avoidance behaviour led to significant increases in both college attendance and college graduation for Vietnam generation males. We use a measure of conscription risk calculated as the average number of inductions over the years a cohort was aged 19 to 22 divided by cohort size. Similar to the case of compulsory schooling laws, males in a cohort with high conscription risk were induced to obtain more college education than they would have chosen to obtain in the absence of the Vietnam War draft.

According to the range of schooling years affected by the instruments, the IV estimates based on compulsory schooling laws and/or child labour laws yield insights into the impact of high school education on labour market outcomes such as unemployment. IV estimates based on conscription risk in the Vietnam War period, on the other hand, illustrate the causal effects of college (post-secondary) education on the outcomes.

Data

Measuring adjustment to employment shocks requires longitudinal data. For example, to study re-employment outcomes among the unemployed we need to be able to observe individuals who are unemployed in some initial period and may be employed or unemployed in some later period. For both Canada and the USA we use two data sources that have a quasi-longitudinal structure. The first is the monthly labour force survey, called the Current Population Survey

(CPS) in the USA and the Labour Force Survey (LFS) in Canada. Both surveys have the feature that respondents remain in the survey for several periods so they can be followed through time. For example, the CPS keeps an individual in the sample for four consecutive months, out of the sample for eight months, then in again for another four months before she leaves the sample permanently. Thus the same individual can be observed in the CPS 12 months later. Our measure of adjustment in this case is the probability of re-employment conditional on being unemployed one year earlier. The Canadian LFS keeps an individual in the sample for six consecutive months. Our measure of adjustment in this case is the probability of re-employment in month six conditional on being unemployed in month one.

In order to take advantage of its large sample size, we also use census data from both countries. The US and Canadian censuses provide information about each respondent’s current labour market status as of the reference week (usually in June of the census year), as well as information about labour market activities in the previous calendar year. In particular, they provide information on the number of weeks spent unemployed and the number of weeks spent working in the last calendar year for each respondent. Based on the census data, we measure adaptability to employment shocks as the probability of being re-employed at the time of the survey conditional on being unemployed in the previous year.

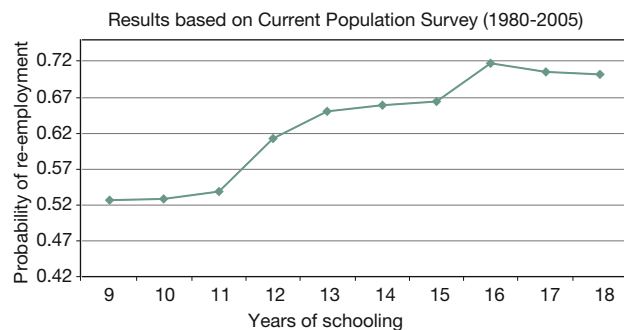
Education and Re-employment Success

As a major adverse employment shock, unemployment is a costly and damaging event for many people. How efficiently unemployed workers can adapt to the changing environment directly determines re-employment success. We measure an individual’s adaptability as the probability of obtaining re-employment conditional on previously being unemployed. Using the empirical strategy described above for estimating causal impacts, we find that education at both the secondary and post-secondary levels promotes re-employment success for unemployed workers.

To provide some insight into the magnitudes involved, Figures 1 and 2 show the nature of the relationship between education and re-employment success among the unemployed using US CPS data (Figure 1) and US census data (Figure 2). These figures are based on a multivariate regression that controls for other influences on re-employment success such as state of residence, age, gender, race, marital status and so on. The figures thus plot the correlation between the probability of re-employment and educational attainment (measured by years of completed schooling) when other influences such as gender, age and race are held constant. In both figures there is a strong positive

4 D. Card, T. Lemieux: Going to College to Avoid the Draft: The Unintended Legacy of the Vietnam War, in: *American Economic Review*, Vol. 91, No. 2, May 2001, pp. 97-102.

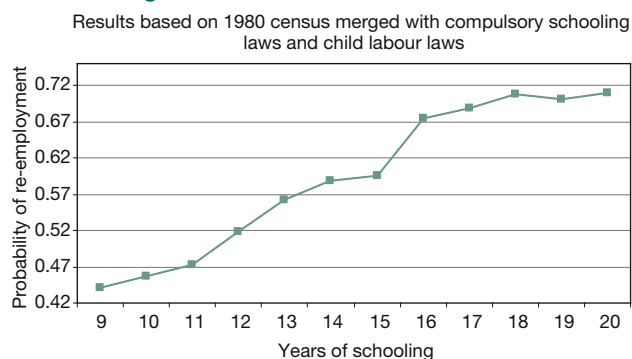
Figure 1
Regression-Adjusted Probability of Re-employment Conditional on Being Unemployed One Year Earlier by Years of Schooling



Note: Regression-adjusted probability of re-employment is obtained by controlling for survey year, survey month, state of residence, age, gender, race, marital status and metropolitan status. The graph displays the coefficient estimates on the complete set of schooling dummies. The intercept applies to the base category – white males surveyed in January 1980 and 1981 who were 35 to 44 years of age, had eight years of schooling or less, were married and lived in a non-metropolitan area in California.

Number of observations: 83,898.

Figure 2
Regression-Adjusted Probability of Full-time Re-employment Conditional on Being Unemployed for more than Eight Weeks in the Previous Year by Years of Schooling



Note: Regression-adjusted probability of full-time re-employment is obtained by controlling for state of birth, state of residence, gender, race and cohort of birth. The graph displays the coefficient estimates on the complete set of schooling dummies. The intercept applies to the base category – white males who were born in California between 1936 and 1945, had eight years of schooling or less and lived in California.

Number of observations: 307,171.

correlation between re-employment success and years of schooling. According to CPS data the probability of re-employment rises from about 0.52 with 9 years of education to about 0.70 with 18 years of schooling, with most of this increase occurring between 11 and 16 years of education. According to census data, the re-employment probability increases from about 0.45 at 9 years to 0.70 at 20 years,

with most of the increase being observed in the interval between 11 to 18 years of schooling. There are also particularly large increases in the re-employment probability at 12 and 16 years of schooling, which correspond to completion of high school and college for most individuals.

The pattern with Canadian data is similar. Figure 3 shows the re-employment probability based on census data, which provides information on years of completed schooling. Figure 4 plots the re-employment probability based on LFS data, which provides information by level of educational attainment.

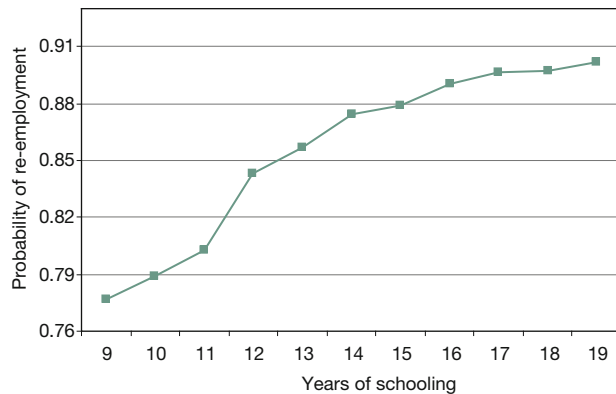
Based on CPS data in the USA, simple multivariate OLS regression estimates suggest that graduating from high school is associated with a 12 percentage point increase in the probability of re-employment on the survey date given being unemployed one year before. An additional year of schooling is associated with a 2 percentage point increase in this probability. These estimates are similar to what one would calculate by a quick inspection of Figure 1. We also find that whites, males, married people and individuals living in large metropolitan areas enjoy an advantage over others in locating a new job. Keep in mind that, as discussed previously, these estimates do not necessarily represent the causal impacts of changes in education.

Our estimates of the causal impacts based on the same data are considerably larger in size.⁵ For example, IV estimates with compulsory schooling laws as instruments indicate that graduating from high school increases the probability of re-employment by 44 percentage points and that an additional year of schooling increases the re-employment rate by over 5 percentage points. Both of these effects are statistically significant and economically large relative to the average re-employment rate of 0.53.

A potentially important issue in examining factors that influence re-employment outcomes is that the sample consists only of the unemployed, which may result in sample selection bias. Education may affect the chances of becoming unemployed and hence the characteristics of individuals in the sample. For example, more educated workers may be more likely to voluntarily leave their jobs and may also transition more quickly to a new job. We therefore exclude from the sample those who entered unemployment by quitting their previous job. Based on this restricted sample, the estimated impact of high school completion on re-employment success declines a small amount according to both the OLS and IV estimates. A small decline is also evident in the impact of education as measured by years of school-

⁵ See our papers for a discussion of differences between OLS and IV estimates.

Figure 3
Regression-Adjusted Probability of Re-employment Conditional on Being Unemployed in the Previous Year by Years of Schooling



Note: Regression-adjusted probabilities of re-employment are obtained by controlling for survey year, province/territory, major city (Toronto, Montreal, Vancouver, or other major city), age, gender, marital status, family size and language. This graph displays the coefficient estimates on the complete set of schooling dummies. The intercept applies to the base category – males surveyed in 1981 who were 35 to 39 years of age, had eight years of schooling or less, were married, lived in a major city other than Toronto, Montreal, or Vancouver, lived in Ontario, only spoke English at the time of the survey and had mean family size.

Number of observations: 458,641.

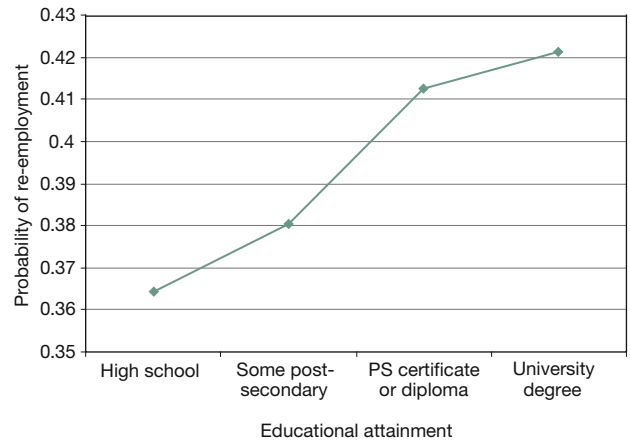
Source: Canadian census (1981-2001).

ing. Overall, however, the estimated impacts of education on re-employment remain large and statistically significant. We further exclude from the sample new entrants and re-entrants, thus focusing the estimation exclusively on job losers. The results are similar to those for the full sample, although the estimates are less precise due to the smaller sample size.

In summary, our IV estimates based on CPS data indicate that additional schooling at the secondary school level does exert a significant positive influence on the re-employment outcomes of the unemployed. The magnitudes of the estimated impacts are large and do not appear to be affected by sample selection.

As a robustness check, we use an alternative data source, the 1980 census in the USA, to investigate the impact of education on re-employment success. The sample size of the census is several times larger than that of the CPS and thus may yield more precise estimates. In addition, because the census was collected at the beginning of our CPS sample period, it is likely that a larger proportion of the census respondents were influenced by compulsory schooling laws, which were more binding early in the 20th century.

Figure 4
Regression-Adjusted Probability of Re-employment in Month Six Conditional on Being Unemployed in the First Month by Educational Attainment



Note: Regression-adjusted probabilities of re-employment are obtained by controlling for survey year, survey month, province of residence, age, gender, marital status, family size and duration of unemployment. This graph displays the coefficient estimates on the complete set of educational attainment dummies. The intercept applies to the base category – married males surveyed in January 1976 who were 35 to 39 years of age, had eight years of schooling or less, lived in Ontario at the time of the survey, had mean family size and mean duration of unemployment.

Number of observations: 249,330.

Source: Labour Force Survey (1976-1996).

The OLS estimates based on the 1980 US census indicate that graduating from high school is associated with an 11 percentage point increase in the probability of full-time re-employment conditional on being unemployed for more than eight weeks in the previous year, while an additional year of schooling tends to increase this re-employment rate by more than 2 percentage points. These OLS estimates are similar in magnitude to those obtained with CPS data. We also find that whites, males and young people enjoy an advantage in locating a new job after being unemployed.

IV estimates based on the census data using compulsory schooling laws and child labour laws as instruments are all statistically significant. These estimates indicate that graduating from high school increases the probability of re-employment by over 20 percentage points, and an additional year of schooling increases the probability of re-employment by 3 to 4 percentage points. Relative to the mean re-employment rate of 0.45, these estimated impacts represent increases of 40-50% and 5-10% respectively.

With 1980 census data, we are able to use an alternative instrument for schooling, conscription risk in the Vietnam War period, which mainly affects post-secondary education. Specifically, we focus on three measures of educa-

tional attainment: college attendance (completing 13 to 15 years of schooling), college graduation (completing 16 or more years of schooling) and years of schooling. All three IV estimates are economically large and statistically significant. The IV estimates indicate that graduating from college leads to a 42 percentage point increase in the probability of full-time re-employment conditional on being unemployed in the previous year, while college attendance increases this re-employment rate by 28 percentage points. An additional year of schooling raises the probability of re-employment by 6 to 7 percentage points.

In similar analyses based on Canadian data, including LFS and census data, our IV estimates of the impact of education on re-employment are similar in magnitude to those found with US data. For example, based on the LFS sample excluding job leavers, high school completion raises the probability of re-employment within the next five months by about 15 percentage points, and each year of additional schooling increases this probability by 1.5 percentage points. These results suggest that the positive impact of education on re-employment holds in different labour markets.

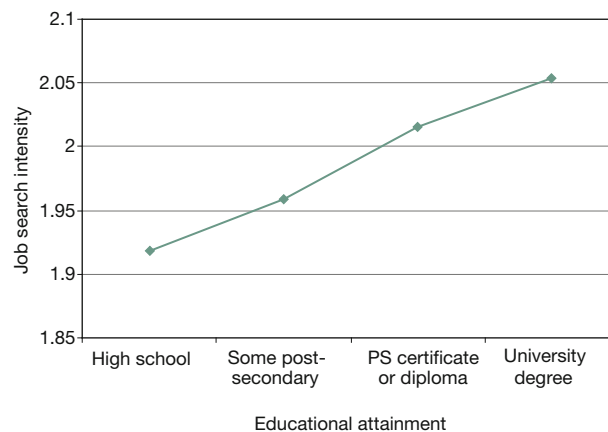
Education and Job Search

Job search intensity is not only a good indicator of individuals' adaptability to employment shocks, but it also is a potential mechanism through which education may increase the probability of re-employment following unemployment. A number of studies on re-employment demonstrate the crucial role of job search behaviour for re-employment.⁶

Our analyses of the impact of education on job search intensity rely on the Canadian LFS (1976-1996). We measure search intensity by the number of active job search methods used in a month conditional on being unemployed in that month. The OLS estimates of the effects of high school graduation and years of schooling on job search intensity indicate that there is a statistically significant partial correlation between education and search intensity. Figure 5 plots this relationship, controlling for other influences on search intensity. Graduating from high school is associated with an increase in the number of active job search methods used in a month by 0.12. An additional year of schooling is associated with an increase in the number of search methods used by 0.02. We also find that people younger than 45, males and unmarried people tend to search more intensively than do other unemployed searchers.

⁶ See, for example H.J. Holzer: Search Method Used by Unemployed Youth, in: *Journal of Labor Economics*, Vol. 6, No. 1, 1988, pp. 1-20.

Figure 5
Regression-Adjusted Job Search Intensity by Educational Attainment



Note: Regression-adjusted job search intensity is obtained by controlling for survey year, survey month, province of residence, age, gender and marital status. This graph displays the coefficient estimates on the complete set of educational attainment dummies. The intercept applies to the base category – males surveyed in January 1976 who were 35 to 39 years of age, had eight years of schooling or less, were married and lived in Ontario at the time of the survey.

Number of observations: 451,120.

Source: Labour Force Survey (1976-1996).

To estimate the causal impact of education on job search, we use changes in compulsory schooling laws in Canada to instrument for schooling. The estimated causal impact of high school graduation on search intensity is 0.17 (about 40% higher than its OLS counterpart), while the IV coefficient for years of schooling is 0.02, about the same as the OLS counterpart. We conclude that educational attainment, whether measured by graduating from high school or years of schooling, exerts a causal impact on job search intensity.

Education and Unemployment Incidence

The impact of schooling on the incidence of unemployment (the likelihood of becoming or being unemployed) is of interest in its own right. It also provides information on the potential selection bias in analysing re-employment success among unemployed workers. We thus apply our IV strategy to estimating the effect of schooling on transitions into unemployment from employment and out of the labour force.

The OLS estimates based on the US Current Population Survey suggest a weak negative relationship between education and the likelihood of job loss, which is defined as the probability of being unemployed on the survey date conditional on being employed one year earlier. However, the IV estimates based on compulsory schooling laws and child labour laws – both those for high school completion and years of schooling – are positive in sign and are not

statistically different from zero. We conclude that there is no evidence that formal schooling reduces the probability of job loss, even though simple inspection of the data indicates that education and the probability of job loss are (weakly) negatively correlated. Results for transitions into unemployment from non-participation are similar.⁷

Similar results are also obtained in our analyses based on US census data with compulsory schooling laws and child labour laws as instruments and analyses based on the Canadian Labour Force Survey with compulsory schooling laws as the instrument. All these results based on IV estimation suggest that additional formal education at the secondary school level does not influence the incidence of unemployment.

In addition to the impact of secondary education, we analyse the impact of post-secondary education on the incidence of unemployment based on the US 1980 census with conscription risk in the Vietnam War period as the instrument. In this analysis, job loss is defined as the likelihood of being unemployed on the census survey date conditional on being employed throughout the previous year. These IV estimates indicate that education does have an impact on transitions into unemployment. Specifically, both college attendance and college graduation reduce the probability of job loss by 11 percentage points, and an additional year of schooling reduces the probability of job loss by 2 percentage points.

⁷ In this case neither the OLS nor IV estimates of the impact of education are statistically significant.

Ilaria Maselli*

The Evolving Supply and Demand of Skills in the Labour Market

This paper analyses labour demand and supply with respect to skills and tasks. The literature on this topic is abundant, especially in light of education expansion and the impact of technology on labour demand. The goal of this work is not to add evidence to the causes and effects of labour demand and supply but rather to sketch the broader picture of their equilibrium and then to try to anticipate what type of skills mismatch EU countries will encounter during the next decade. The paper begins with separate considerations of la-

* The author would like to acknowledge the support of the FP7 Social Science and Humanities project NEUJOBS for work which underpinned this paper. However, the views in the paper are entirely those of the author.

Concluding Remarks

To our knowledge, our research is the first to provide evidence on the causal link between education and transitions between employment and unemployment. Our research also contributes to the growing literature on the private and social benefits of education. Further, our findings bear several implications for public policy. First, they provide empirical evidence that supports education as an effective means to enhance adaptability, a valuable characteristic in a changing labour market. Second, to the extent that education may reduce unemployment incidence, increase job search intensity and improve re-employment outcomes among the unemployed, the private and social benefits of education may be understated by standard outcome measures (e.g. earnings). Third, our research lends support to the case for education as a “preventative” alternative to government-sponsored adjustment assistance policies, which are often based on a “repair shop” model that deals with problems *ex post*. As is believed to be the case with health care, preventative strategies may be more efficient than “repair shop” strategies in addressing labour market challenges.

It is also important to note that our analyses based on US and Canadian data yield very similar results on the impact of education on unemployment incidence and re-employment success. This suggests that our findings tend to hold across different labour markets. It would be informative to investigate in future research the extent to which our findings also hold in labour markets beyond North America.

bour demand and supply with respect to qualification, outlining the main trends and their causes. This is followed by an analysis of their equilibrium and a matrix which can be used to understand the potential types of mismatches. Finally, conclusions and avenues for future research are drawn.

Labour Demand

The key to understanding changes in labour demand is job polarisation. In 2003, Autor, Levy and Murnane¹ initiated

¹ D. Autor, F. Levy, R.J. Murnane: The skill content of recent technological change: An empirical exploration, in: Quarterly Journal of Economics, Vol. 118, No. 4, 2003, pp. 1279-1333.

a new stream in the labour economics literature when they noticed that labour demand in the USA was polarised with respect to wages, meaning that it grew stronger for both low-paid and high-paid jobs while shrinking in the middle. According to the authors, the job polarisation phenomenon helps to explain the rapid increase in income inequality experienced in the USA starting at the end of the 1970s. While it is difficult to determine whether this is a new phenomenon, as appropriate wage data rarely go back beyond the 1990s, the authors' approach is quite innovative.

The literature on labour demand tends to consider two types of skills, low and high. Adding a third category, medium-skilled jobs, allows us to draw a more complex picture. These three categories are used to group the nine basic categories of occupations listed in the International Standard Classification of Occupations (ISCO).² The first three mainly include high-profile jobs: managers, professionals, technicians. The last one, elementary occupations, includes such jobs as cleaners; labourers in construction, manufacturing and transport; and food preparation assistants. Between these are five categories of middle-skilled jobs such as plant and machine operators, electrical and electronic trades workers and craft and related trades workers.

Figure 1 shows changes in employment in the EU27 between 2000 and 2010 for each qualification group. What we would normally expect is that demand for workers rises as the skill content of these occupations increases in a linear fashion. The picture is instead U-shaped, as predicted by job polarisation, and it is the result of an approximately 20% increase in the demand for low-skilled and high-profile occupations between 2000 and 2010 and a 4.5% decrease in the demand for middle-skilled occupations.

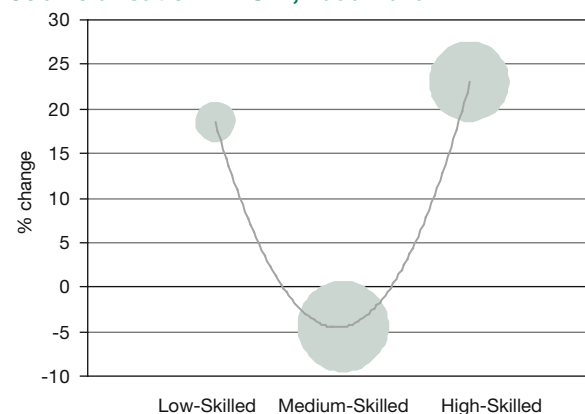
Is this phenomenon widespread in European countries? To answer this question we need a numerical definition of job polarisation. We can affirm that polarisation occurs if demand for both high-profile and low-skilled jobs is higher than the demand for middle-skilled ones.

According to this definition, polarisation occurred in 17 out of 27 EU countries.³ In Sweden for example, demand for both high-skilled and low-skilled occupations increased by more than 20%, while the demand for medium-skilled occupations declined by 2%, as shown in Figure 2. In the remaining ten countries, employment in high-skilled occupations still increased substantially, but low-profile employment increased less (or decreased more) than middle-skilled employment, thus indicating a linear trend. Figure 2 demonstrates this us-

² ISCO88 is used in this analysis. The tenth category, Armed Forces, is not counted.

³ BG, DE, EL, ES, FR, IT, CY, HU, MT, NL, AT, PL, RO, SL, FI, SE, UK.

Figure 1
Job Polarisation in EU27, 2000-2010



Source: Own elaboration of Eurostat – Labour Force Survey data.

ing Belgium as an example, where demand for high-skilled occupations has been buoyant, but where both middle- and low-skilled jobs were not in high demand over the previous decade.

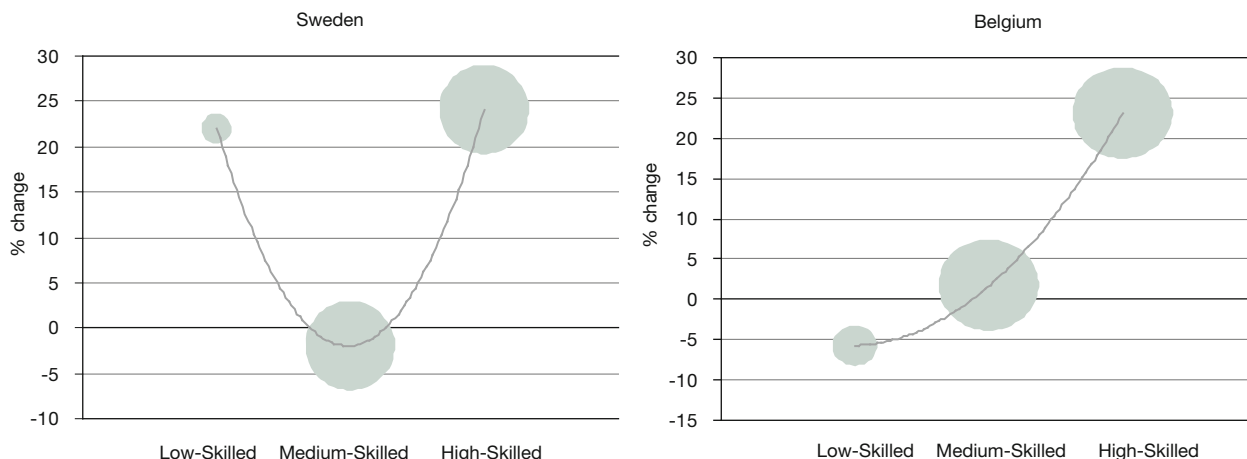
What is the factor that explains the different shapes of the changes in labour demand? One aspect is surely technology: two main theories exist to explain the relationship between labour demand and innovation: skill-biased technological change (SBTC) and task-biased technological change (TBTC).

The basic idea behind the SBTC theory is that technology is biased in favour of skilled workers and against the less-skilled ones, as it complements the former and substitutes the latter. In other words, technological progress tends to increase the demand for skilled labour and decrease the demand for less-skilled tasks. The main empirical work in this field has been carried out by Goldin and Katz⁴, who explain that younger and more educated individuals will grasp new technologies more quickly and therefore will be in high demand. But what makes the change skill-biased is also the type of technology. The relationship between the relative employment of the highly skilled, on the one hand, and measures of technology, like computer investments and use, R&D expenditure and capital intensity, on the other, is clearly positive. This is due to the fact that this technology is complementary to human input, in particular in the first phase of the production process when raw capital has to be created, installed and maintained. This model seems better-suited to the Belgian-type curve.

At the beginning of the new millennium, an alternative hypothesis to SBTC emerged to explain the trend towards polarisation: task-biased technological change. Autor, Levy and Mur-

⁴ C. Goldin, L.F. Katz: *The Race between Education and Technology*, 2008, Harvard University Press, pp. 89-128.

Figure 2
Changes in Labour Demand: Sweden and Belgium, 2000-2010



Source: Own elaboration of Eurostat – Labour Force Survey data.

nane⁵ changed the focus and shifted attention from skills to tasks. They distinguish three types: routine tasks, non-routine manual tasks and non-routine intellectual ones. Technology has its strongest impact on the routine tasks, because it is easier to create machines that substitute for people in repetitive types of work. Interestingly enough, these are not considered “bad jobs”, as they normally occupy the middle ranks of wage distributions.⁶ The upper category, intellectual tasks, is still affected but, as also theorised by SBTC, in a complementary sense: very sophisticated software can help architects produce fancy plans but cannot replace their creativity and experience. The middle category, manual tasks, is less affected by technology because these tasks require limited skills that are not replaceable by machines for the reason that they are not repetitive. The theory is also called the “routinisation hypothesis” because the overall impact of technology consists in squeezing the middle category and expanding the remaining two. This second model constitutes a potential explanation for the type of changes in labour demand seen in Sweden.

Another stream of the literature attributes changes in demand to globalisation, or more specifically, to offshoring and the offshorability of jobs. Blinder⁷ argues that the migration of jobs from the USA and from rich countries in general towards poorer ones is likely to become a phenomenon comparable to the industrial revolution. All in all, based on his 2004 analysis of 817 occupations, Blinder finds that between 22% and

29% of all the jobs in the US workforce are potentially offshorable.

In the same tone but with a different perspective, Autor, Dorn and Hanson⁸ estimate the impact of rising Chinese import competition between 1990 and 2007, starting from two observations: (i) the share of total US spending on Chinese goods rose from 0.6% in 1991 to 4.6% in 2007, and (ii) there was an increase in transfer payments through a series of federal and state programmes, especially disability, retirement and in-kind medical benefits. They find that “increased exposure to low-income country imports is associated with rising unemployment, decreased labour-force participation, and increased use of disability and other transfer benefits” in exposed local labour markets.⁹ They also find that the decline in employment and wages is not limited to the manufacturing sector and therefore leads to an overall decrease in the average earnings of households. Numerical estimates are rarer for European countries due to data problems, but empirical results for the UK show that international outsourcing has increased the demand for skilled labour.¹⁰ As far as the service sector is concerned, offshoring is still at a relatively low level compared to manufacturing offshoring¹¹, but it is growing much faster. Amiti and Wei¹² and Hijzen et al.¹³ do not find any strong negative effects on employment and argue that

5 D. Autor, F. Levy, R.J. Murnane, *op. cit.*

6 M. Goos, A. Manning: Lousy and Lovely Jobs: The Rising Polarisation of Work in Britain, in: *The Review of Economics and Statistics*, Vol. 89, No. 1, February 2007, pp. 118-133.

7 A.S. Blinder: How Many U.S. Jobs Might Be Offshorable?, CEPS Working Paper No. 142, Princeton University March 2007.

8 D. Autor, D. Dorn, G. Hanson: The China syndrome: local labour market effects of import competition in the United States, MIT Working Paper, August 2011, p. 4.

9 *Ibid.*

10 A. Hijzen, H. Görg, R.C. Hine: International outsourcing and the skill structure of labour demand in the United Kingdom, in: *Economic Journal*, Vol. 115, 2005, pp. 860-878.

11 M. Amiti, S.J. Wei: Fear of service outsourcing: Is it justified?, in: *Economic Policy*, Vol. 20, No. 42, 2005, pp. 308-347.

12 *Ibid.*

13 A. Hijzen et al., *op. cit.*

services offshoring makes employment in offshoring firms grow faster than otherwise.

Ultimately the two theories do not really compete with one another: routine jobs, for example, could be replaced by technology, by cheaper labour in developing countries or by a mix of the two. Firpo, Fortin and Lemieux¹⁴ argue in fact that technological change¹⁵ played a central role in the 1980s and 1990s, while offshorability became an important factor beginning in the 1990s.

Labour Supply

The evolution of labour supply with respect to skills has followed a clear path: since the post-war period, all countries have undertaken a substantial expansion of education. The trend is the result of two phenomena: the ageing of populations (with older and less educated generations being phased out of the labour market) and changing patterns of qualification acquisition.¹⁶ Nowadays in most (if not all) EU countries, the universalisation of secondary education is a consolidated achievement, and the attention of policymakers has shifted to tertiary education. Expanding higher education is also a core objective at the European level: the EU2020 strategy, for instance, recommends that at least 40% of 30-34 year-olds complete tertiary education. Therefore educational expansion is certainly not a new phenomenon: skills upgrades characterised all advanced economies in the 20th century. However, what may be new in the 21st century is the universalisation of higher education. According to Trow, there are three levels of tertiary education participation: elite if it is reserved to only a few, mass when more than 15% of the relevant population participates and universal when participation rises above 50%.¹⁷ With respect to this categorisation, it is worth noting that during the decade 2000-2010 all EU countries surpassed the 15% target, thus achieving mass higher education, and one country, Ireland, is approaching the universalisation level.

In general it can be observed that the growth in the economically active population's educational level followed, as expected, a linear trend over the last decade. This is the product of a decrease in the number of people who have only primary education, a moderate increase or stabilisation in the group that has secondary education and a substantial

growth in the number of university graduates. EU27 aggregate figures constitute a textbook example (Figure 3). The number of people among the economically active population with only primary education declined by 15% in the period 2000-2010, the number of those that completed high school increased by 13% and the number of tertiary education graduates increased by 30%.

A reference definition is necessary to compare country performances. For this purpose, we define educational expansion as that process which entails an increase in the supply of workers with tertiary education that is bigger than the increase in the supply of workers with secondary education, which is itself bigger than the increase in those with primary education. In these terms, educational expansion occurs in all EU27 countries with only two exceptions: Denmark and Lithuania. In the former there was a substantial increase in workers with only primary education (18.4%), which is possibly due to immigration. In Lithuania, there was an unusual 19.6% decrease in the number of workers with tertiary education, which could be explained by emigration in this case.

Demand and Supply

We now examine the match between the demand and supply of education with respect to skills and occupations over the period 2000-2010 based on a combination of the figures introduced above. The research question that drives this section is the following: given the trends outlined above, what is the equilibrium between the supply and demand of skills, and how homogenous is it across countries?

As a starting point, Figure 4 displays the combination of the EU27 evolution of demand and supply in a bubble chart. The position of each bubble represents the growth rate over the decade. Each bubble's size corresponds to the share of that group in the population (total employment or economically active population) in 2010.

The share of middle-skilled occupations in total employment is 50.4%, and the share of the labour supply with a secondary degree is 48.2%. However, these trends are moving in opposite directions: the latter has grown by 13.2% while the former has declined by 4.5%. The share of low-skilled workers is small (22.2%) and rapidly decreasing (-15.2%), most probably due to a phasing out of the older and less educated generation from the labour force. The percentage of low-skilled occupations increased by 18.4%, resulting in a 9.8% share of these types of jobs in the economy. A third of the total labour force is highly educated, and the size of this group grew by 44.9% over the period 2000-2010. Meanwhile, demand for these workers grew more modestly (23%) but still accounted for 39.8% of total employment.

14 S. Firpo, N.M. Fortin, T. Lemieux: Occupational Tasks and Changes in the Wage Structure, IZA Discussion Papers No. 5542, 2011, Institute for the Study of Labor (IZA).

15 Together with deunionisation, in the sense of the decreasing participation of workers in trade union organisations.

16 CEDEFOP: Supply and Demand in Europe – Medium Term Forecast up to 2020, Luxembourg: Publications Office of the European Union, 2010.

17 M. Trow: Problems in the Transition from Elite to Mass Higher Education, Carnegie Commission on Higher Education, Berkeley 1973.

All in all, the static picture is good: there are precisely as many medium-skilled jobs as there are medium-skilled workers. There is still room for further educational expansion at the tertiary level, and the phasing out of older, low-educated workers along with the increase in the number of low-skilled occupations approaches equilibrium. However, a good current match could lead to a future mismatch, given that the trend towards an upskilling of the population is likely to continue into the future and that the shape of labour demand is difficult to predict. For this reason, CEDEFOP projections prove very helpful. Figure 5 replicates Figure 4 with data for the decade 2010-2020.¹⁸ The forecast reveals that the current dynamic is likely to improve the match between demand and supply during the course of the current decade.

However, as is often the case with comparative analysis, divergences across EU countries are strong, both in terms of levels and changes. In Figure 6 four countries are compared: two with a current good match, Estonia and Hungary, and two with a serious mismatch, Portugal and Spain.

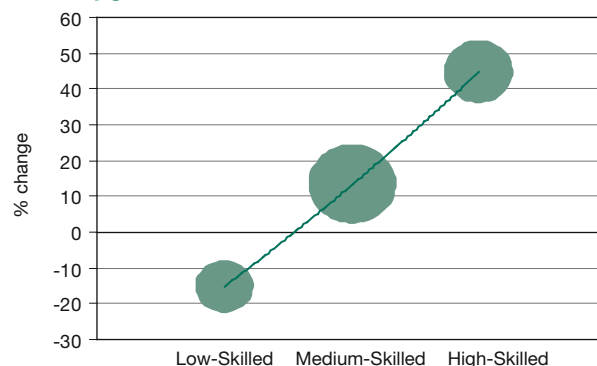
In Estonia and Hungary, for instance, the share of workers that have completed high school has already outpaced the demand for medium qualification jobs. In Spain there is a perfect equilibrium between the supply and demand of highly qualified profiles but a strong mismatch at the remaining two skill levels. Portugal is an interesting case because on the one hand a large share of the population still holds only primary education, and on the other the demand for medium- and high-qualified jobs grew spectacularly. This indicates that the process of educational expansion in Portugal is far from complete.

Vertical Mismatch

As we have shown, there is a trend towards polarisation on the labour demand side with respect to occupations in most European countries, whereas on the supply side, the trend is towards a linear upskilling of the population. Depending on the speed of these changes and on the skill content of current demand and supply, there is a risk that in some countries a skill mismatch problem will arise. More specifically, there is a risk of vertical mismatch, meaning that there is no correspondence between the formal qualification demanded by a certain job and the qualification of the worker. Medical professions provide a good example: it is legally forbidden to practice as a doctor without the relevant university degree. The vertical mismatch can be of two types: overqualification or unfulfilled demand. The first occurs when a certain worker

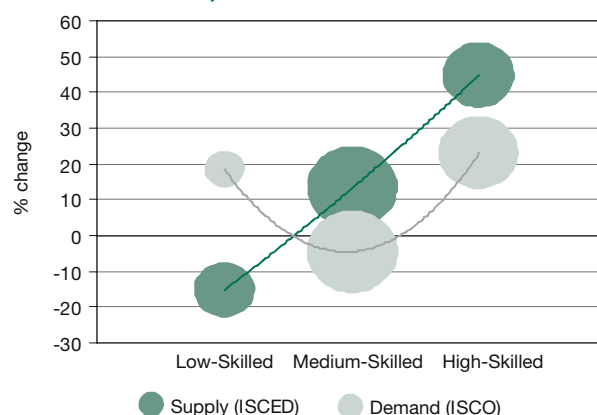
¹⁸ With one difference: Figure 4 only considers the economically active population aged 25-64, while CEDEFOP projections instead consider the population aged 15+. This entails marginal adjustments in the absolute values but leaves the proportions unchanged.

Figure 3
Skills Upgrade in EU27, 2000-2010



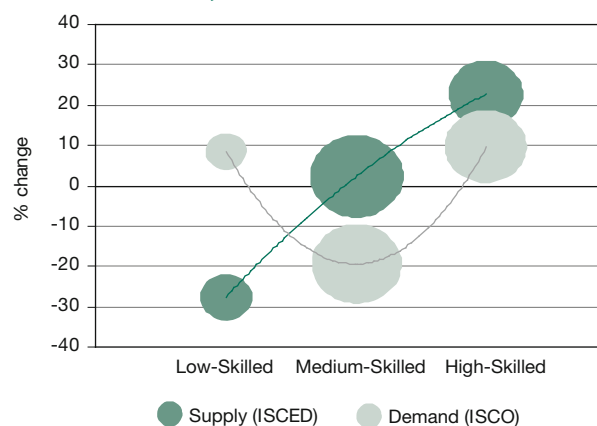
Source: Own elaboration of Eurostat – Labour Force Survey data.

Figure 4
Demand and Supply of Work with Respect to Skills/ Tasks in the EU27, 2000-2010



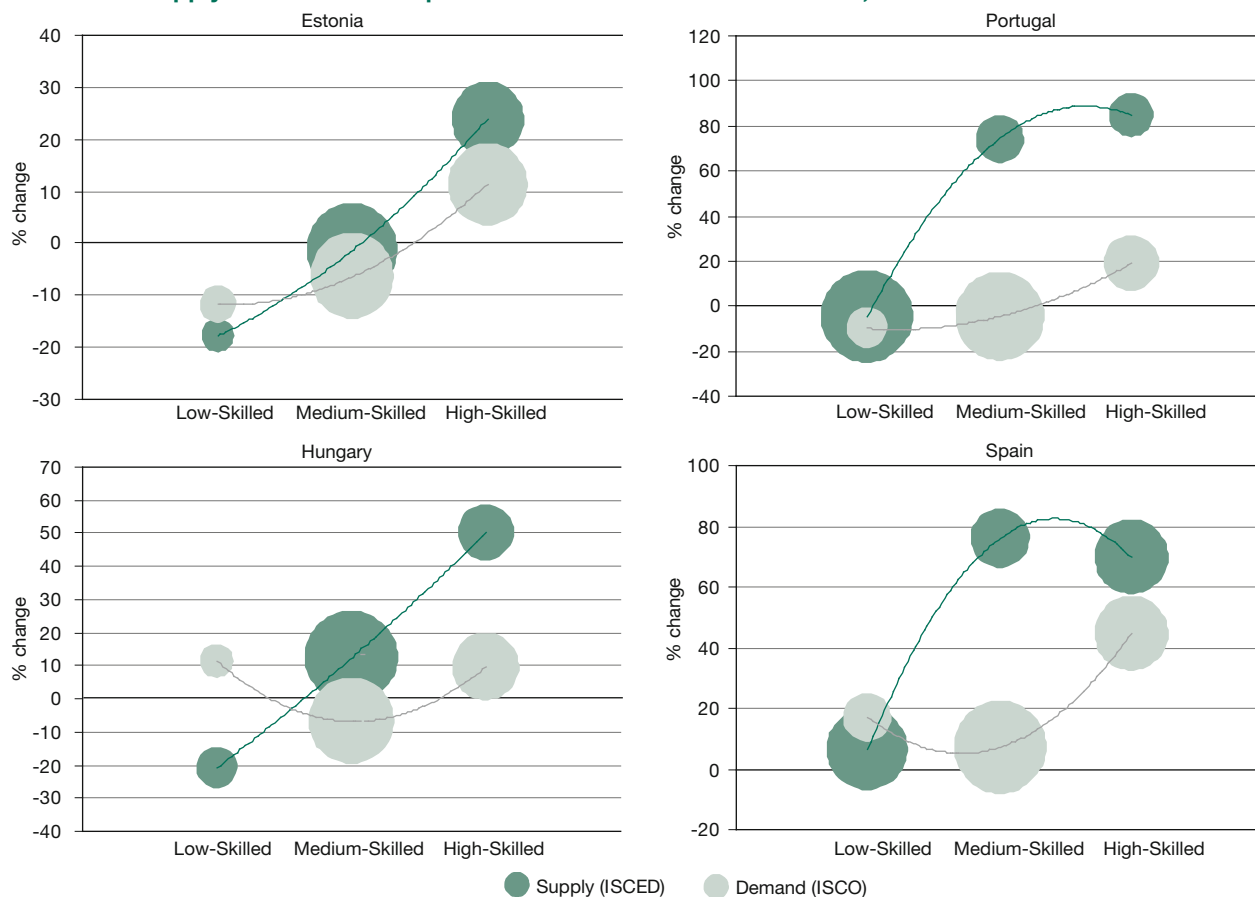
Source: Own elaboration of Eurostat – Labour Force Survey data.

Figure 5
Demand and Supply of Work with Respect to Skills/ Tasks in the EU27, 2010-2020



Source: Own elaboration of CEDEFOP forecasts.

Figure 6
Demand and Supply of Work with Respect to Skills/Tasks in Four Countries, 2000-2010



Source: Own elaboration of Eurostat – Labour Force Survey data.

has a higher level of education than required by his/her job. The second occurs when a job vacancy remains unfilled because potential candidates do not fit the requirement of the job.

To understand what type of mismatch countries may incur in the next decade, the following framework is used and summarised in Table 1. Each country is classified first according to its current situation, which can be either a state of equilibrium across the three categories or one of tension, meaning that there is no correspondence between one (or more) of the categories (vertical axis of Table 1). The horizontal dimension of the table is meant to provide an insight into the future level of correspondence, which depends on the current equilibrium and the speed of convergence or divergence. Assuming that the drivers that characterised the period 2000-2010 will continue to shape demand and supply in the current decade, five categories are hypothesised for the future match based on the literature previously examined: shortage of low-skilled workers, excess supply of low-skilled workers, overqualification of middle-skilled workers, overqualification of high-skilled workers and equilibrium across the three qualifications.

Among countries starting from a position of equilibrium, two possible future outcomes dominate: either equilibrium or “displacement” of the middle-skilled workers. The latter outcome is the result of two opposite trends: a further expansion of the middle-skilled labour supply, already abundant in these countries, and the shrinking of middle-skilled occupations. This group of country is relatively homogeneous: we find it in the Baltic countries, the UK, Austria, Germany and central European countries whose economic structures are linked to Germany. As the likelihood of finding an appropriate job diminishes, what will be the fate reserved for those who complete high school in these countries? Unless new technology is introduced to shape the production mode, two possibilities emerge: they must either compete with the low-skilled for less qualified jobs or acquire new skills to compete for the high-profile ones.

A current equilibrium can also generate two further types of mismatches: a shortage of low-skilled workers and the overqualification of high-skilled ones. The first problem may be cause for concern in Poland, where a polarisation of demand occurred, creating new elementary occupations while the

Table 1
Dynamic and Static by Country

Static	Dynamic				
	Shortage of low-skilled	Low-skilled unemployment	Middle-skilled "displacement"	Over-qualification of high-skilled	Equilibrium
Equilibrium	PL		DE, ET, LV, LT, HU, AT, SI, SK, UK	BG, IE	EU27, BE, FI, RO, SE, FR
Tension		EL, IT, PT, MT, DK		CY	CZ, NL, LUX

Source: Own elaboration.

percentage of people with only primary education dropped by half to 7.4% during the 2000-2010 period. The second risk concerns Bulgaria and Ireland, where demand for and supply of high-skilled workers is in perfect balance but supply is growing much more quickly. The case is similar for Cyprus, even though it started from a more unbalanced situation at the medium-skilled level in the 2010-2020 period.

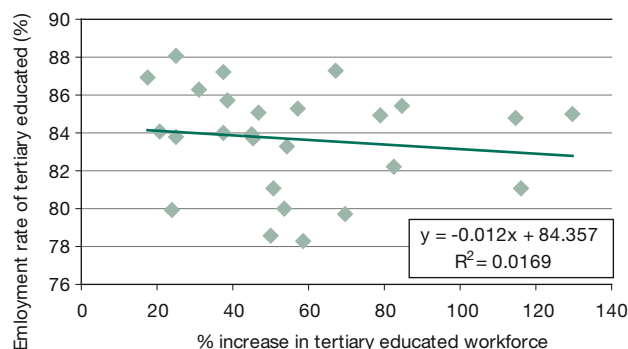
Among countries with a mismatched starting situation, with the exception of the Czech Republic, Luxembourg and the Netherlands, which are moving towards equilibrium, one outcome prevails: low-skilled unemployment. This risk is shared by Greece, Italy, Malta, Portugal and Denmark, where the number of low-skilled workers in the economically active population is so high that even an increase in demand for them in the countries where job polarisation occurs (Greece, Italy and Malta) cannot compensate for the size of the group.

Enough Graduate Jobs for Graduate Workers?

One of the research questions that inspired this work is whether there will be enough graduate jobs for the increasing number of tertiary graduates. This question is at the heart of the literature on over-education, an issue that has received enormous attention from academics. It is difficult to give a clear and exhaustive answer, as the literature itself does not reach a unanimous conclusion.¹⁹ However, three facts have to be taken into account.

19 There are two main reasons to explain the inconsistency of the results: one is the lack of appropriate data (F. Green, Y. Zhu: Overqualification, job dissatisfaction, and increasing dispersion in the returns to graduate education, in: Oxford Economic Papers, Vol. 62, No. 4, pp. 740-763). The other is the existence of different methodologies, none of which are more convincing than the others (D. Verhaest, R. van der Velden: Cross-country differences in graduate overeducation and its persistence, Research Memoranda 007, ROA, Research Centre for Education and the Labour Market, Maastricht 2010).

Figure 7
Relationship Between the Expansion of Tertiary Education and the Employment Rate of High-Skilled Workers



Note: The expansion represents the change from 2000 to 2010. The employment rate is for the year 2010.

Source: Own elaboration of Eurostat – Labour Force Survey data.

First of all, there is no relationship between an expansion of the high-skilled workforce and its employment rate. There is no evidence that the employment rate of the highly skilled is lower in the countries in which the high-skilled workforce rapidly expanded in the last decade. Yet the opposite is not true either – as shown by the nearly flat line in Figure 7 (the slight inclination is too small to be considered indicative).

The second fact concerns the homogeneity of the graduate group. If the labour market does absorb the increasing high-skilled supply at least in terms of average employment rates, it is likely that the variance within the high-skilled group diverges. Research shows that as more people obtain a degree, the value of the degree varies either based on the prestige of the university or on the subject of studies. Sloane and O’Leary²⁰ argue that in the UK “there are still sizeable returns to be attained from undertaking a degree. However, focusing just on the returns to a degree relative to those without degrees can be misleading, since there are substantial differences in the return to different types of degree. Further, the types of degree offering the highest returns are different for men and for women.”²¹ According to their study, taking Arts as the comparator as this is the subject with the lowest returns, the subjects with the highest returns for men are Maths and Computing, Medicine, Engineering and Technology, and Business and Financial Studies. For women the highest returns are found for Medicine, Education and Architecture. For both men and women the second- and third-lowest rankings (above Arts) are filled by Social Sciences and Language

20 P.J. Sloane, N.C. O’Leary: The Return to a University Education in Great Britain, IZA Discussion Papers No. 1199, 2004, Institute for the Study of Labor (IZA).

21 Ibid., p. 19.

es.²² Similarly, Reimer, Nolke and Kucel²³ analyse how field of study affects unemployment and occupational status for university-educated graduates in 22 European countries. They discover that relative differences among fields increase with educational expansion at the university level. More specifically, they find that in most countries university graduates with a humanities degree have higher risks of unemployment, whereas unemployment rates tend to be relatively low for graduates from the health/welfare field. Their main explanation for this phenomenon is that “educational expansion is associated with a decline in mean ability in less academically challenging fields like the humanities or social sciences. (...) Due to self-selection and institutional sorting, additional lower ability students will increasingly end up in less academically challenging fields like the humanities and social sciences. This in turn lowers the signal value of the respective degrees on the labour market, which is observed as lower occupational status and higher unemployment risk.”²⁴

The third element, pointed out by Elias and Purcell²⁵, is that what we today consider to be a graduate job cannot be seen as a frozen and immutable category. In order to better describe the heterogeneity of high-skilled occupations, Elias and Purcell develop a new classification for graduate employment and distinguish between four possible categories: traditional graduate occupations (doctors, lawyers), modern graduate occupations, where an undergraduate title became necessary in the 1960s (IT, primary school teachers, journalists), new graduate occupations, where graduates with degrees have increasingly been recruited (welfare officers, sales managers) and niche graduate occupations, where most workers do not have a degree but specialists are emerging (leisure, sport, hotel managers).

All in all, policymakers do not (yet) need to worry about the destiny of future university graduates. Although the return from various majors turns out to be differentiated, data indicate that high-skilled workers do usually find jobs and, according to forecasts, demand for them will continue to grow strongly. CEDEFOP²⁶ estimates that, when considering supply developments in the demand projections, the overall number of jobs employing highly qualified people is projected to rise by almost 16 million between 2010 and 2020.

22 This is consistent with another study by M. Bratti, R. Naylor, J. Smith: Different returns to different degrees? Evidence from the British Cohort Study 1970, The Warwick Economics Research Paper Series (TWERPS) No. 783, 2007, University of Warwick, Department of Economics, that finds Arts and Social Sciences at the bottom of the ranking.

23 D. Reimer, C. NoeIke, A. Kucel: Labor Market Effects of Field of Study in Comparative Perspective, in: International Journal of Comparative Sociology, Vol. 49, No. 4-5, 2008, pp. 233-256.

24 Ibid., pp. 250-251.

25 P. Elias, K. Purcell: Seven Years On: Graduate Careers in a Changing Labour Market, Manchester 2004.

26 CEDEFOP, op. cit.

Shrinking Middle- and Low-Skilled Jobs

What perhaps needs more attention is the remaining part of the skills spectrum. As indicated earlier, demand for workers in elementary occupations²⁷ increased in 17 out of 27 European countries between 2000 and 2010. There are two reasons for this rise. On the one hand, in many cases, these low-skilled jobs cannot be automatised or outsourced because they require physical presence and human interaction, e.g. truck drivers and cleaning staff. On the other hand, low-skilled jobs owe their new success to a combination of societal factors such as population ageing and the higher participation rates of women in the labour market, factors which increase the need for personal services. Autor and Dorn²⁸ document an increasing trend in the working hours in “service occupations”²⁹ in the USA. For this group, the share of labour hours grew by 35% between 1980 and 2005, even though jobs in this category require among the lowest levels of education and are among the lowest paid.

What ultimately needs to be studied more closely is therefore the middle category.³⁰ Regardless of whether one prefers to attribute changes in labour demand to polarisation or skill-biased technological change, it is incontestable truth that the demand for middle-skilled occupations showed negative growth in most countries and did not surpass 5% growth anywhere. At the same time, the supply of workers with an equivalent diploma increased as a product of educational expansion. Figure 8 shows that in 2010 the share of middle-skilled workers already outpaced the share of middle-skilled jobs in countries like Slovakia, the Czech Republic, Austria and Germany.

The threat of the hollowing out of the middle class has been captured by other studies, even though their starting point is an analysis of wage data. For instance, a study by Grabka and Frick³¹ calculates that between 2000 and 2006 the middle class³² in Germany shrank from 62% to 54% of the population. The authors attribute the squeeze in part to the Hartz

27 Defined by ISCO as “simple and routine tasks which mainly require the use of hand-held tools and often some physical effort”, see <http://www.ilo.org/public/english/bureau/stat/isco/>.

28 D. Autor, D. Dorn: Inequality and Specialization: The Growth of Low-Skill Service Jobs in the United States, MIT Working Paper, June 2011, <http://econ-www.mit.edu/files/1474>.

29 According to the US Census classification, service occupations are jobs that involve assisting or caring for others, including: food service workers; security guards; janitors and gardeners, cleaners; home health aides; child care workers; hairdressers and beauticians; and recreation occupations.

30 Average employment rates in the EU are 53.8% for the low-skilled, 73.1% for the middle-skilled and 83.9% for the high-skilled.

31 M.M. Grabka, J.R. Frick: The Shrinking German Middle Class – Signs of Long-Term Polarization in Disposable Income? DIW weekly report No. 4/2008, Berlin.

32 Middle class is defined as those whose income falls between 70 and 150 per cent of the median.

welfare market reform and in part to the changing structure of employment. Similarly, a report by The Economic Council of the Labour Movement shows that 31.5% of the Danish population belonged to the middle class in 2002. Seven years later that share had dropped to 28.6%.³³

How can job polarisation combined with an educational upgrade of the population be turned into an opportunity? According to Brynjolfsson and McAfee³⁴, the solution is organisational innovation: “co-inventing new organisational structures, processes, and business models that leverage ever-advancing technology and human skills. Joseph Schumpeter, the economist, described this as a process of ‘creative destruction’ and gave entrepreneurs the central role in the development and propagation of the necessary innovations”³⁵. In suggesting this, they quote a few examples of companies like Apple, Google, Facebook, Amazon and Ebay that created added value and jobs with brand new “product categories, ecosystems, and even industries”³⁶.

Conclusions

Many researchers have speculated on the challenges imposed upon the labour market by educational expansion and technological change. The objective of this paper has been to sketch the potential consequences of a certain evolution of labour demand and supply with respect to qualifications. In doing this, it is necessary to remember that there is no single European labour market: the skill composition of labour supply and demand as well as their changes are highly differentiated cross-country, leading to all sorts of equilibria.

In summary, it can be said that the educational expansion of the European economically active population will not stop in the next decade; it is still prominent on policy agendas and its benefits outpace its cost, especially if one takes a broader view and considers aspects like the cultural, societal and political benefits of a better educated population. What is more difficult to predict is labour demand. Theories and forecasts suggest that high profile jobs will continue to be requested by companies. So will elementary occupations that can be neither offshored nor replaced by technology because they require interaction and physical presence. Nonetheless, this will

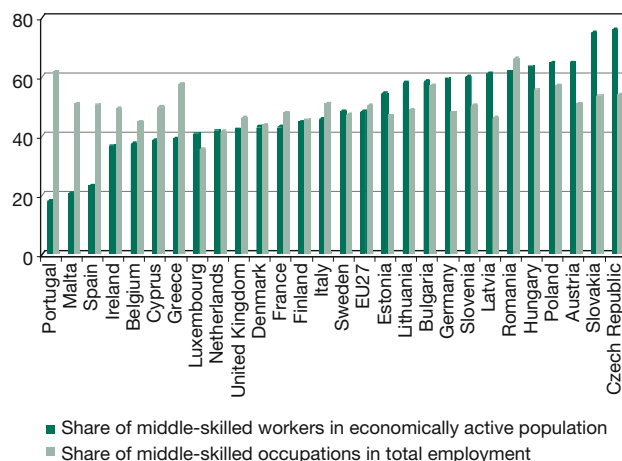
33 J.J. Schytz: Middelklassen bliver mindre, Arbejderbevægelsens Erhvervsråd 2011. Information reported in English by Frederik Janssen on the Social Europe Journal Blog (<http://www.social-europe.eu/2011/08/the-danish-middle-class-is-shrinking/>). The middle class is defined as those with an income equivalent to 85-115 per cent of median income.

34 E. Brynjolfsson, A. McAfee: *Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, 2011, Digital Frontier Press, Kindle Edition.

35 E. Brynjolfsson et al., op. cit.

36 Ibid.

Figure 8
Share of Middle-Skilled Workers/Jobs, 2010



Source: Own elaboration of Eurostat – Labour Force Survey data.

not be enough in countries like Greece, Spain, Italy, Malta and Denmark to compensate for the still relatively high number of low-skilled workers in the economically active population.

Another clear trend of the last decade is the shrinking of the central category where middle-skilled jobs are concentrated. Current dynamics imply that unless new technology is introduced in the organisation of work, this category risks losing the most from the future potential equilibrium, especially in Germany, Austria, Hungary, Slovakia, Slovenia, the UK and the Baltic states. More research is needed to understand whether the middle category will compete for lower- or higher-skilled jobs and what the consequences of the new equilibrium will be. It can be anticipated that income inequality may increase as an effect of job polarisation, a phenomenon that has already been documented in the UK and the USA. But the consequences of the shrinking middle fall in the broader domain of social sciences and therefore must also be analysed through the lens of sociology and political science. A second aspect of further reflexion has to do with anachronism: changes in demand in this paper are analysed on the basis of ISCO 1988.³⁷ As pointed out by Elias and Purcell³⁸, the definition of a graduate job is not frozen in time: what we consider a graduate job today, such as a journalist, did not require tertiary education twenty years ago. The same applies to non-graduate jobs: with the help of technology, some former graduate jobs have been de-skilled (accounting for example), and the quality of other low-skilled jobs has been increased. This is fundamental to achieving a match between future labour demand and supply.

37 A new version of ISCO was elaborated in 2008. However, the use of the new data is currently limited.

38 P. Elias, K. Purcell, op. cit.