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Graduates and ‘graduate jobs’ in Europe: a picture of growth and diversification

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Abstract

We address the question of how the supply and demand for graduates is changing in western, northern and southern Europe in the 21st century. We find that the proportion of the population with tertiary qualifications is increasing everywhere. But only in the Anglo and Nordic countries has the share of high-skill employment grown fast. The prevalence of graduate underemployment varies, partially reflecting the aggregate imbalance between the supply of graduates and the prevalence of graduate jobs. Over time the rate of graduate underemployment has increased in southern Europe and in Ireland, but not everywhere. In real terms graduate earnings have been declining in some of the southern countries, while they continued to rise in Nordic countries. In most countries, the average graduate earnings premium, relative to workers with upper secondary education, has remained largely stationary, exceptions being Portugal and Greece where it declined markedly. There was a rising earnings penalty for underemployment of graduates in Austria, Ireland and Italy, but none elsewhere. Though we can be confident the supply of graduates will continue to rise in the coming decades, the future for graduate jobs is especially uncertain at this juncture.

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Summary

This paper brings together existing and new evidence to address the question of how the supply and demand for graduates has changed in Europe in the 21st century, and to speculate on the future labour market. The paper builds a comparable picture of the recent graduate labour market in a number of countries, taking a complementary approach that uses explicit data on graduate labour supplies, graduate jobs and earnings, and includes a focus on earnings dispersion. Its focus is Europe where, despite efforts towards cross-national harmonisation, there are a variety of higher education and further education systems, as well as economies with varying degrees of development, labour market norms, and inequalities. Its purposes are primarily descriptive and it covers the period 2004 to 2015, as dictated by the latest available data in consistent series.

There are four substantive parts to this picture: the growth of the graduate labour supply, the trends and variation in graduate jobs, the trends and variation in graduate underemployment and the dispersion of the earnings premium. The main findings are:

- The proportion of the population with tertiary qualifications is increasing in all countries examined, and will continue to do so. The pace of expansion varies and there is no sign of a convergence.
- Across all country groups, job polarisation has further continued between 2004 and 2015. But despite similar exposure to global demand drivers, there are differences in job polarisation patterns across country groups – notably in the growth of high-skilled employment. In southern Europe, the employment share of low-skilled occupations grew the most, followed by high-skilled occupations. The continental European countries had an overall more stable employment structure. But in the Anglo and Nordic country cluster the share of high-skill employment has grown the fastest, at more than half a percentage point a year.
- The prevalence of graduate underemployment varies, partially reflecting the aggregate imbalance between the supply of graduates and the prevalence of graduate jobs. Over time the rate of graduate underemployment has increased in southern Europe and in Ireland, but not everywhere.
- In real terms graduate earnings have been declining in some of the southern countries, while they continued to rise in Nordic countries.
- Across most countries, the average graduate earnings premium, relative to workers with upper secondary education, has remained largely stationary, exceptions being Portugal and Greece where it declined markedly.
- There is evidence of a rising earnings penalty for underemployment of graduates in Austria, Ireland and Italy, but none elsewhere.
- Though we can be confident the supply of graduates will continue to rise in the coming decades, the future for graduate jobs is especially uncertain at this juncture.

1. Introduction: optimists, pessimists and the need for a “complementary” understanding of the graduate labour market

The graduate labour market is often conceived as a race between new technology – with its assumed rising demand for college-educated workers – and the rising supply of graduates in the labour force following the massification of higher education (Goldin and Katz, 2008). The metaphor has some force, in that competition is ingrained in both markets and races, but falters when it comes to equilibrating forces for graduate labour, which must act on a timescale of not months but decades. Given the vast resources involved in higher education, the potential for substantive disequilibrium in the graduate labour market motivates the need to follow its evolution closely.

At the risk of oversimplifying, one can distinguish two broad understandings of recent graduate labour markets, one hopeful the other pessimistic. The optimistic approach looks primarily to the earnings premiums (sometimes loosely referred to as the "returns") associated with achieving a higher education qualification, taking this to be the key signal, sometimes the only one. While this approach has its roots in human capital theory (Becker, 1962; Schultz, 1961), there is a vast literature estimating the returns to different levels of education across a range of countries and regions (e.g., Psacharopoulos and Patrinos, 2004), which can be interpreted within a general framework of supply and demand without necessarily invoking human capital theory's individualistic methodology. The fact that in many countries over recent decades the premium has been mainly stable or slightly increasing, despite the mass expansion of college participation, is seen as evidence that the demand for graduates' skills has been increasing alongside the supply of graduates. With a dearth of evidence about trends in the social returns to higher education, this evidence on the private returns has often stood in, somewhat dubiously, to underpin the case for supporting the ongoing expansion of higher education. We call this approach "optimistic" from graduates' point of view, because it suggests that their labour market prospects have been and remain good; where higher education participation entails high debt, the optimistic approach expects this to be sustainable.

Of course, such an outlook is likely to be less common in countries where the average returns have declined, such as Spain, Italy (Crivellaro, 2016) or Taiwan (Huang and Huang, 2015). The pessimistic understanding of graduate labour markets in other countries comes from studies that put an explicit focus on indicators of the demand for high-skilled labour. Such studies often come to the conclusion that it is not credible to presume that the demand for high-skills has risen as fast as the stocks of graduate labour in past decades (e.g. Holmes and Mayhew, 2014, 2016; Warhurst and Thompson, 2006). It is questioned whether modern technology really does require increasing skills, with the impact of IT in particular seen as encouraging “digital Taylorism” (i.e. jobs with more employer control and requiring more intensive effort, rather than higher skill) (Brown et al, 2011). Even if some technologies could

be skill-biased, the assumption of human capital theory that an increased supply of graduate skills would induce employers to adopt different product strategies and forms of work organisation that would utilise those skills is questioned. Evidence that the same occupation is populated by increasing proportions of graduates is taken as implying, either that an increasing proportion of graduates are underutilising their skills in the workplace, or that graduates' skills have been decreasing as college grades are inflated. That employers continue to demand more graduate qualifications is interpreted as reflecting increased credentialism and the 'positional' character of education (Bol, 2015). And the stability of the graduate earnings premium is seen as no guarantee that graduates are not underutilising their skills (since graduates may be displacing non-graduates, "bumping" them down to even less-skilled work). From this perspective, then, the graduate labour market might be a race, but the steed which represents the demand for high-skilled labour is falling behind.

The fact that such contrasting understandings of the graduate labour market can be held by distinguished scholars who have access to the same data seems, on the face of it, quite extraordinary. And the difference between these understandings is reflected in another contrast, that between two broad approaches to national policy making: whether based only on the supply-side, or whether based on an industrial strategy and a skills strategy which explicitly strive for co-development with interventions on both the supply side and the demand side (UK Commission for Employment and Skills, 2009).

Our position on this clash of understandings is as follows. We find that it is indeed analytically useful to study direct indicators of the demand for high-level skills. Nevertheless, it is an open question as to whether this means we should have a very pessimistic outlook; and we also hold that the study of earnings premiums provides meaningful complementary information. Our "complementary" approach, which entails examining the supplies of graduates, the generation of "graduate jobs" *and* the earnings premium directs attention not just to the average earnings premium in the economy but to its dispersion among groups and among sectors of the economy. The potential consequences of such heterogeneity in graduate labour markets are substantial, including, for individuals, an increased risk to the higher education investment, which is all the more significant in an environment of rising student debt. And a dispiriting social consequence of a rising dispersion of earnings premiums is that it places limits on the extent to which higher education can lift people into high-skilled jobs and promote social mobility; this is especially true if those from less privileged social backgrounds become concentrated in the lower parts of a widening dispersion as appears to have happened in Hong Kong (Lee, 2016; Mok and Neubauer, 2016).

The seeds of potential differentiation are many. They include skill-biased technical change, employment polarisation due to automation, and the globalisation of high-skilled labour markets – including "offshoring" – alongside increasingly global HE participation (Acemoglu and Autor, 2011; Van Reenen, 2011, Brown et al., 2011).

The processes of polarisation and automation are especially uncertain in the current era, when the robot is being heralded as capable of replacing human labour on a scale hitherto unknown, ushering in what has been termed a “fourth industrial revolution”. Apart from the imagined scale, what also distinguishes the scenarios of several writers is the charge that automation will come to replace many high-level, non-routine, cognitive tasks as well as low-skilled routine tasks (e.g. Ford, 2016). It has also been claimed that the age of Information and Communications Technology, which is characterised as a “general purpose technology” that affects all industries, sectors and occupations, has since 2000 entered a mature phase in the United States, in which innovative investments have peaked and accordingly the demand for high-skilled labour has gone into reverse (Beaudry et al., 2016).

Such demand-side forces are complemented by signs of increasing dispersion in the quality and extent of higher education supply, with quality varying between institutions as the sector expands to accommodate new providers, and with students differentiating themselves by pursuing a post-graduate degree (Lindley and Machin, 2014), or by the subjects they study (Kelly et al., 2010; Frenette, 2004; Walker and Zhu, 2011).

It could be expected, then, that the already-known dispersions may be increasing, with different groups gaining increasingly diverse benefits from higher education. Indeed, the diversity of higher education and of labour markets may have reached the point that it may be misleading to think of the graduate labour market even approximately as a single entity. The prospects may be optimistic for some, in particular those in favoured segments of the graduate labour market closely involved at the front end of innovating processes, yet becoming pessimistic for others.

The evidence on such dispersions, and indeed on the distribution and trends for graduate jobs generally, is quite limited, often applying to just one country. But the factors driving both the expansion of higher education and the utilisation of graduate skills are not simply national: they have common causes. Both the expansion of participation in higher education and the spread of new technologies are ubiquitous. Cross-country variation in the graduate labour market would arise if the pace of HE participation and technological change varies across countries. Institutional factors, whether within education or production systems, are also likely to affect the match between graduates' skills and jobs, and may also account for some of the cross-country variation. In some countries the demand for and the supply of graduates may be changing together, remaining reasonably well balanced; in others a systematic disequilibrium could arise for which there are no obvious short or even medium term homeostatic processes.

Our aim in this paper, therefore, is to build a comparable picture of the recent graduate labour market in a number of countries, using the complementary approach that brings together explicit data on supplies, demands and earnings, and includes a study of graduate earnings dispersion. We focus mainly on countries in Europe where, despite efforts at cross-national harmonisation, there are a variety of higher

education and further education systems, as well as economies with varying degrees of development, labour market norms, and inequalities. Our purposes are primarily descriptive. Given prevailing technological and political uncertainties, not helped by deficits and disputes in understandings of the past and present graduate labour markets, a broad comparable picture of the latest decade of change using the complementary approach should be informative. We cover the period 2004 to 2015, as dictated by the latest available data in a consistent series.

There are four substantive parts to this picture: the growth of the graduate labour supply, the trends in graduate jobs, the growth of graduate underemployment (sometimes termed "overeducation") and the dispersion of the earnings premium. For this description, we deploy a conventional institutional classification of countries in order to group countries in our displays of outcomes. The result is a visual indication of whether between group differences are notable.

After outlining our data in the next section, we proceed in the following four sections with each part of the picture. In the concluding section we speculate about the future prospects for graduate labour markets, consider the potential consequences of increasing graduate underemployment, and take note of implications for future research.

2. The data

The following empirical analysis mainly draws on the EU Statistics on Income and Living Conditions (EU-SILC). This set of annual household surveys on income, poverty, living conditions and social exclusion was launched in 2003 in six EU member states (Belgium, Denmark, Greece, Ireland, Luxembourg and Austria) and Norway. It has since been extended to all EU countries and a few other European non-member states. EU-SILC consists typically of random probability samples with a rotating panel component that follows individuals for a maximum of usually four years. Yearly refreshments with new survey members ensure stable sample sizes. The surveys are output harmonised with the aim of providing up-to-date comparative information for social reporting across EU countries (Iacovou et al., 2012). In other words, EU-SILC does not deploy harmonised questionnaires but provides a list of comparable indicators across countries. Consequently, practices and information collected can vary between countries. Income in some countries is, for example, collected in net terms whereas others collect gross figures. Data collection mode also differs: a few countries rely on administrative registers to provide information for a range of variables (Lohmann, 2011) complemented by surveys of representative persons in households.

Our analyses draw on the cross-sectional files from 2005 to 2015. The sample is restricted to full-time employees between 25 and 59 years old who have finished education and were in uninterrupted paid work over the 12 months before the

interview. In this paper we do not include information from the former communist countries. This simplifying exclusion is motivated partly by a desire to present a digestible picture of a complex story, but also by the fact that many older workers in these countries will have graduated under different systems before the political and economic transition in the early 1990s. We expect to include these countries in a later paper. To structure the cross-country comparisons, countries are grouped drawing loosely on the literature on welfare-state regimes (e.g, Esping-Andersen, 1990), the 'varieties of capitalism' approach (e.g., Hall and Soskice, 2001) and research on education systems (e.g., Allmendinger, 1989). Following these research strands, we group Denmark, Finland, Norway and Sweden into a cluster of Nordic countries. Austria, Belgium, Germany, Netherlands and Switzerland form a group of continental European countries. A group of southern European countries comprise France, Greece, Italy, Portugal and Spain. Finally, Britain and Ireland are grouped into a cluster of Anglophone countries. The aim is to portray patterns of labour market outcomes of college graduates within and across these country groups.

Annual gross earnings are converted into Euro, deflated using CPI data from Eurostat (in 2015 prices) and finally transformed into monthly gross income values. Extreme outlying income values are set to missing.²

In what follows, statistical inference uses individual-level cross-sectional survey weights and accounts for correlated error terms at the household level (Goedemé, 2013). For most countries, EU-SILC data became available from 2005 on (i.e. from the financial reference year 2004). Exceptions are Greece (2007), Italy (2007), Portugal (2007), Spain (2006), and Switzerland (2008). We drop German observations from 2005 and 2006 as most data were collected from a quota sample which limits the possibilities for accurate inference. The UK team switched surveys in 2011 with consequences for income components and their distribution; thus for our analyses of earnings in Section 6 we do not use the more recent data from the UK.

Some of our analyses draw additionally on official labour force figures from Eurostat and additional micro-level information from the EU labour force survey (EU-LFS) 2004-2015. We use the EU-LFS to trace changes in the supply of college-educated labour and the occupational position of graduates in the labour force between 2004 and 2015. Occupations in the EU-LFS are organised according to the International Standard Classification of Occupations (ISCO). ISCO organises jobs into occupations based on skill levels and skills specialisation. At the top level it distinguishes between 10 major groups: Managers, Professionals, Associate Professionals, Clerks, Service Workers, Skilled Agricultural Workers, Skilled Trades and Crafts Workers, Plant & Machine operators, Elementary Occupations. With each

² Log real gross equivalised monthly earnings are regressed on broad educational levels, occupations, the interaction between education and occupation, gender, regional degree of urbanisation and age in country by country regressions. To allow for lifecycle differences all covariates are fully interacted with age. If the observed income figure is 3.5 standard deviations below or 5 standard deviations above the predicted value, income is set to missing.

step down the hierarchy these broad groups are broken down into more nuanced occupational titles. The 2004 EU-LFS classified occupations are based on the ISCO revision from 1988. By 2015, the updated and revised ISCO-08 system had been implemented. Compared with its predecessor, the new classification expands especially the field of associate professions by adding occupations concerned with ICT and health-related services and thus moves new or upskilled jobs into the group of high-skilled occupations.

3. The growth of the graduate labour supply

In all but the poorest countries across the globe, mass participation in higher education participation has emerged in recent decades as an ubiquitous phenomenon. The Gross Tertiary Enrollment Ratio (GTER), which was 32 per cent in 2012, has been growing by one percentage point a year, and appears to face no social, political or economic limits before near-saturation of the young population (Marginson, 2015). Multiple socio-economic and political factors lie behind the aspirational surge to reach the end of tertiary education and so find a place in society – some common to all, others with distinctive national specificities – yet nowhere is there any significant sign of an end to this trend, nor of any convergence to a world-system logic of rising participation.

The overall consequences for labour markets are inevitable: a rise in the supply of graduate labour. Taking all our 16 European countries together, the proportion of tertiary-educated workers in the labour force rose from 29 per cent in 2004 to 36 per cent in 2015.

The pace of expansion, however, varies across countries. In order to begin to understand how the graduate labour markets differ, it is useful first to picture the range of change. Where is the fastest growth to be found, and where the slowest? Which countries are likely to grow fastest in the future? And, in the light of the Bologna process and other convergent regulatory pressures (Powell and Solga, 2010) is there any convergence in the labour force, whereby the countries with the faster-growing supply of graduates are catching up with others who were ahead of the game, or is there some divergence, with countries pulling apart?

Figure 1 shows the level of attainment of tertiary education for the population aged 25 to 64 in 2015. For most countries, attainment is above 30 per cent, the exceptions being Italy, Portugal and Germany. Italy, in particular, is notable for falling some way behind the rest of the other countries. Countries with high proportions – above 40 per cent – of tertiary-educated workers are Switzerland, Ireland, the UK, Finland, Norway and Sweden.

The figure also shows that everywhere the proportion of tertiary-educated labour has been growing, though at varying speeds. To picture any evidence for convergence, Figure 2 plots the growth rate of tertiary participation against the initial rate of

participation in 2004. We see from the scatter of points that there is no obvious evidence of any convergence or divergence.

Is growth likely to continue in the coming decade? A comprehensive forecast of the tertiary labour supply is normally feasible in most countries, given sufficient data on enrolment and drop-out rates, though they should be moderated by estimates of prospective net migration. Without such data, a rough-and-ready indication of the future direction is, however, easily available from the gaps between the tertiary education achievement ratios of young and older cohorts. Where the gap is large, with the young being educated to a much higher level, we can expect a high growth rate of the overall education level of the workforce, as older cohorts begin to retire and are replaced by the young (Green, 2013: 167-9).

Figure 3 shows a positive gap in all countries, consistent with the expectation that the labour force as a whole is everywhere becoming more educated. Yet there is substantive variation in the young/old gap across countries. Remarkably, the gap is smallest in Germany, suggesting that Germany is set to become even more of an outlier in the overall graduate labour market in coming years. Finland is also expected to grow its tertiary labour force only slowly in coming years. Ireland, by contrast, has the second largest gap, after France, indicating if anything that this already highly-educated country is likely to be pulling away ahead of other countries. Taken together, there is no obvious sign of a convergence process.

In sum, we can conclude that in every one of our countries the labour force is becoming more educated, in so far as the proportion of the population with tertiary qualifications has been increasing and will continue to do so. Nevertheless, the graduate labour forces are expanding at a widely varying pace, and there is little sign of a sustained convergence.

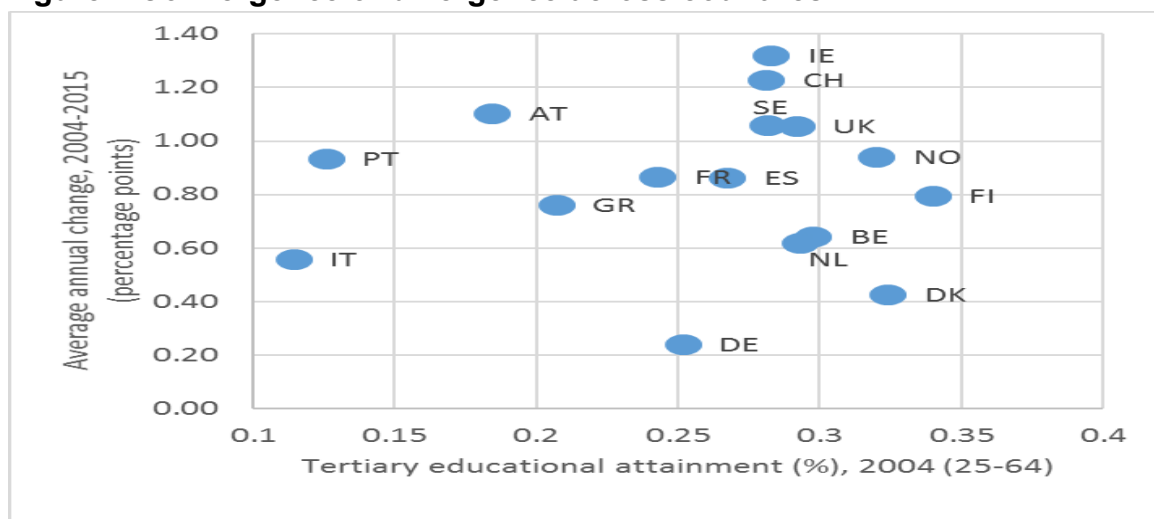
Figure 1 Level of tertiary educational attainment 2004 & 2015 (30-34 years)



Source: EU-LFS. Eurostat figures.

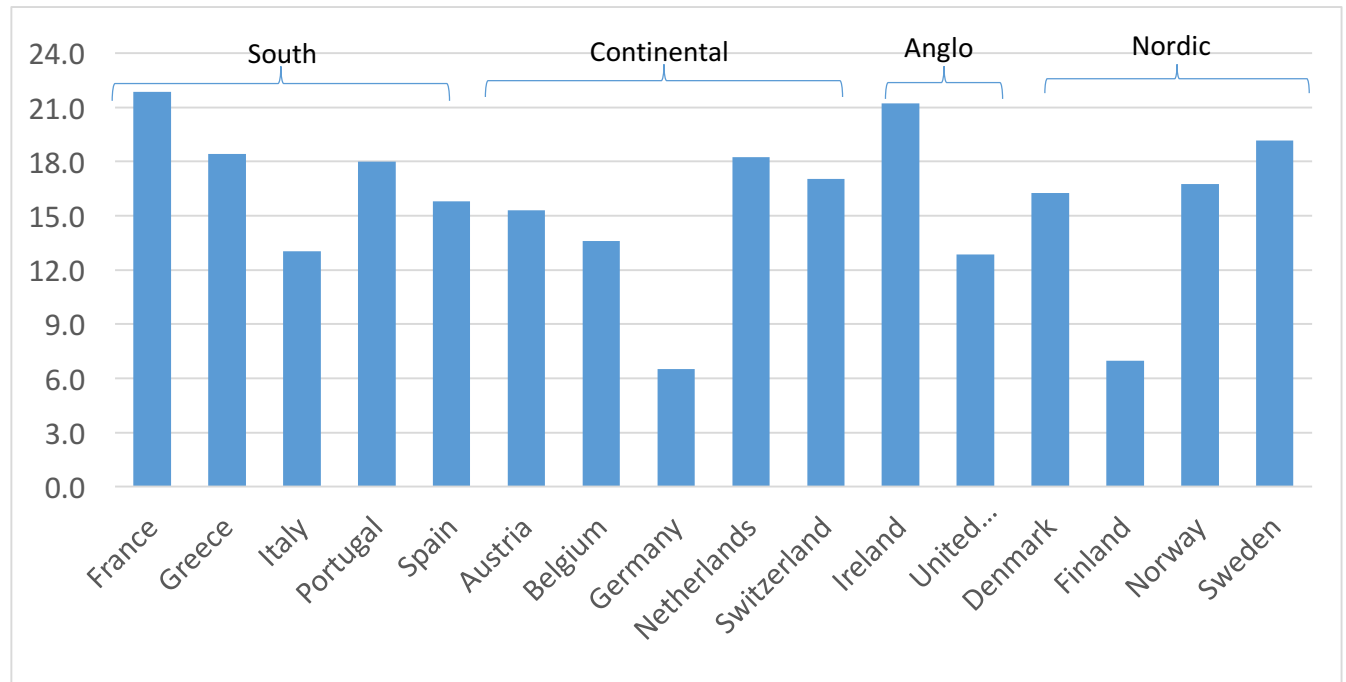
Note that some changes can occur through relabelling of qualifications as tertiary that had previously been categorised as upper-secondary.

Figure 2 Convergence or divergence across countries?



Source: EU-LFS. Eurostat figures

Figure 3 The gap in tertiary education between 30-34 and 50-64 years olds, 2015



Source: EU-LFS. Eurostat figures

4. Trends in graduate jobs

The demand for high-skilled labour and the concept of a "graduate job"

If the graduate labour supply is universally growing, albeit at a varying pace, what can be said about the labour market demand for workers educated to this level? Any such discussion should be grounded initially in a theoretical framework that gives primacy to the agency of the employer. Employers are assumed in economics to be motivated primarily by a profit objective, but key to an understanding of the demand for highly skilled labour is the socio-economic environment in which decisions on labour deployment are made. The resource-based view (RBV) of the firm, particularly as it is developed within strategic human resource management theories, suggests the need to understand managerial cultures and their evolution, in addition to the role of technological change (Green, 2013: Ch. 5). The implication is that, whereas new technologies might expect to become universally adopted in similar ways, cross-country variations in industrial and labour market institutions³ can lead to substantive variations in the demand for high-level skills. The changing and internationally-variable shape of product demand, and hence of industry demand, is also likely to be a major force driving the demand for skills. For example,

³ "Institution" is here used in its broadest, Veblenian, sense to include norms and habits of thought, as well as legal and regulatory structures.

demographic changes such as population ageing imply rising demands for caring and health services, and the skills needed for these industries.

Technology is widely found to have been, for at least several decades, on a path of becoming more skills-intensive: economics' term for this is "Skill-Biased-Technological-Change" (SBTC), while sociology's phrase is "the knowledge economy", specifically the proposition that competition between economic regions is driven by skills (again, in their broadest sense (Green, 2013: Ch. 1). SBTC, however, has been modified to allow for a nuanced description of the changing demand for skills, whereby in accordance with SBTC there is a growing demand for high-level skills, but that there is also a growing relative demand for non-routine lower-level skills, albeit slower than the growth of high-level skills demand. This "task-based" analysis of changing occupational skills demand predicts that middle-paid, middle-level skilled tasks are the most susceptible to being displaced by automation (Autor et al., 2003). Similarly, many of the middle-level jobs have been those that have most easily been offshored from the developing countries to well-educated labour forces in low-wage countries (e.g. Blinder and Krueger, 2013). As a result of all these factors, an "asymmetric polarisation" of occupations is observed in a number of developed countries in certain periods over the recent decades (e.g. Goos and Manning, 2014).

Much of the demand for high-skilled labour is likely to be met by graduate labour, but the decision to deploy graduate labour, as opposed to alternative sources of skills from those trained to a high level through work-based routes, depends on the relative price and quality of those alternative sources of skilled labour. In each country the relative quality of non-graduate skilled labour depends on the quality of the institutions for vocational skills training, and on that of the higher education system as well as the skills acquired beforehand in the school system.

Within this framework, a "graduate job" can be defined as one "where a substantial portion of the skills used are normally acquired in the course of higher education, including many of the activities surrounding it, and of its aftermath—the years after higher education when skills are acquired in work through graduates' acquired faculty for learning them." (Green and Henseke, 2016a: p.3). The skills that are used in a graduate job may include professional skills, cognitive skills, knowledge creation, information-processing and management skills, as well as high-level communication skills (Allen and Van der Velden, 2011; Barone and Ortiz, 2011). This skills-oriented definition is quite distinct from the tautological concept of a graduate job as being "what graduates do".

The creation of an indicator for "graduate job" with analytical value, is, however, a practical issue of some concern. For the most part, analysts use official occupational classifications, dividing broad groups of occupations into major groups, mainly based on skill requirements as determined by experts. Typically, a graduate job is one that falls into the first three major groups: Managers, Professionals, and Associate

Professions.⁴ The European Commission, for example, deploys this indicator to assess the proportion of underemployed tertiary graduates (European Commission, 2015). We shall use this approach below for looking at changes in graduate jobs over the years.

However, recent research has developed more satisfactory and discerning skills-based methods for distinguishing between graduate jobs and other jobs, that go below the major group level of disaggregation. In this approach, most jobs in the first three major groups are deemed to be graduate jobs, but not all. For example, managers of small retail outlets are typically not found to be graduate jobs in most countries. For a review of such methods, see Green and Henseke (2016a,b). Our preferred, validated, method uses direct indicators of the skills requirements of jobs as reported by workers doing the jobs. Using such skills-based data, we have been able to trace the evolution of graduate jobs in Britain and Germany, and to generate indicators for graduate jobs across several OECD countries (Henseke and Green, 2016). Dividing jobs into graduate and non-graduate jobs is, of course, only a crude classification of the complex world of employment, and some jobs are close to the dividing line. Nevertheless, this simple dichotomy, using a skills-based approach, proves to be a good discriminator of wages, job satisfaction and training opportunities in modern work life.

The graduate job is, then, a viable tool for helping to understand the demand for graduate labour, and it can be used to organise some big questions about high-skilled work in the modern economy. How are graduate jobs distributed across countries, and do they exhibit similar, or predictably varying patterns of growth? Are graduate jobs inexorably and universally growing in their prevalence, or is there evidence of saturation in the deployment of graduates' skills? What does the future hold for graduate jobs?

Changes in Britain

These questions cannot all be comprehensively answered with available data. Not least, we lack sufficient ongoing skills utilisation data for many countries. Britain, however, is one country where we are able to provide perhaps the fullest picture. The polarisation of British occupations between 1979 and 1999 was exposed in a widely-cited article (Goos and Manning, 2007). In a recent study, Salvatori (2015) updates the picture to 2011.⁵ Salvatori's analysis shows an increase between 1979 and 2011 in the share of employment taken up by the top quintile of employment as ranked by the median wages of workers in occupations in 1979 (Figure 4). There was a much smaller increase in the share of occupations from the lowest quintile. The remaining occupations, those with a median wage in the third to eighth deciles,

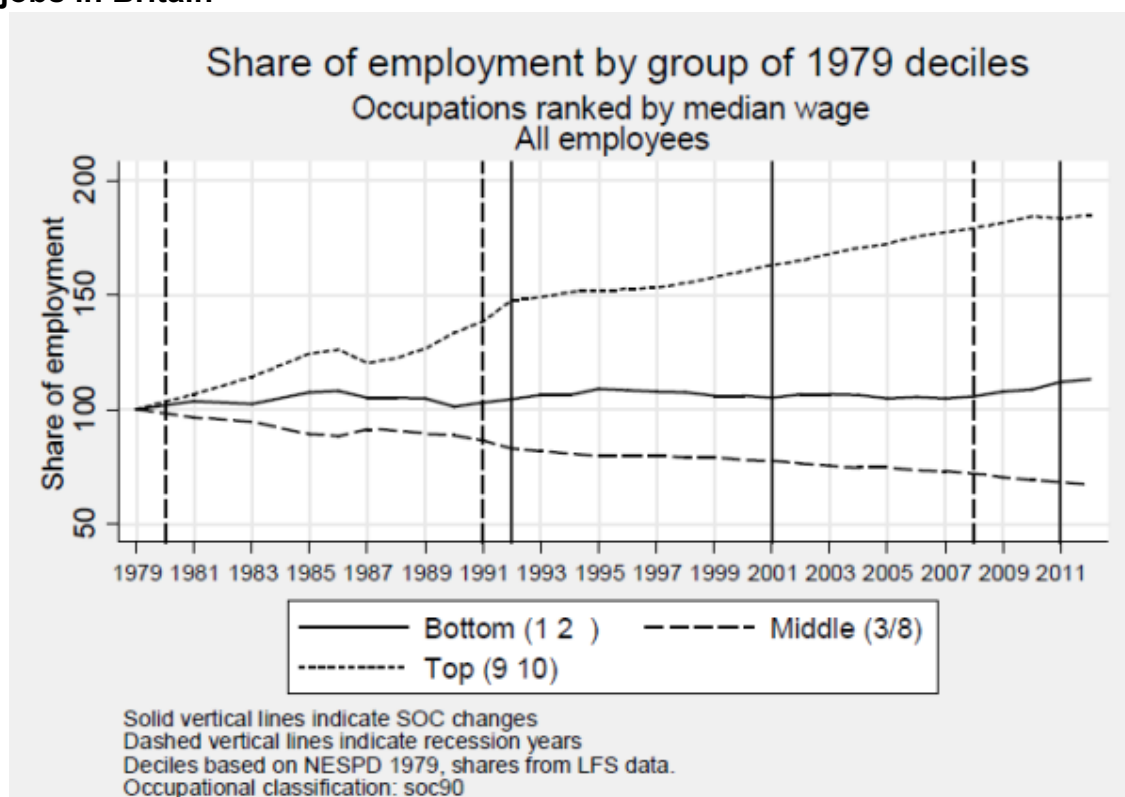
⁴ Alternatively, in a more traditional approach, just the first two of these.

⁵ For such a long-term perspective it is necessary to allow for periodic re-classifications.

experienced a declining share of employment. Thus, asymmetric polarisation appears to have been an ongoing phenomenon in Britain, at least in terms of the occupations ranked by their wages.

The changing composition of occupations, however, only partially captures the changing share of graduate jobs. Even if we were to accept a rather artificial definition of a graduate job in 1979 as being in the top quintile of the earnings distribution at that time, in subsequent years it is possible that some lower-ranked occupations might experience skills-biased changes, leading them to become graduate jobs; conversely, some of the top quintile occupations, if they experienced some de-skilling, could cease to be graduate jobs.

Figure 4 Employment polarisation and the long-term growth of top quintile jobs in Britain



Source: Salvatori (2015, p.36)

Note: Occupations ranked by median wage, all employees. Solid vertical lines indicate SOC changes, dashed vertical lines indicate recession years. Deciles based on NESPD 1979 shares from LFS data.

Using skills utilisation data from the British Skills and Employment Surveys, we pooled data from the 1997 and 2001 surveys, and compared our findings about graduate jobs with pooled data from the 2006 and 2012 surveys. Between these two periods, graduate jobs became much more prevalent, rising by 10 percentage points from 31 per cent to 41 per cent. Thus, even though this was a period of rapid growth

in the supply of graduates – by as much as 12 percentage points over this interval – the prevalence of graduate jobs was more or less keeping up. This was, in other words, a time of rapid growth in the demand for graduate labour in Britain.

Much of this 10 point rise – about seven points – was "structural", that is, originating from the growing shares of the jobs that were in 1997/2001 defined as graduate. This fact should not be surprising given the ongoing rise of high-wage occupations depicted in Salvatori's diagram above during the 2000s. However, there was also a three point rise originating from jobs that were reclassified between the two periods (referred to as "within-occupation" change). One example of such a job is farm manager, which is now a graduate job but used to be a non-graduate job. In effect, we see a process of skill-biased technical change driving the demand for graduates in Britain's labour market, not only increasing the number of people in traditional graduate occupations, but also transforming through upskilling a small number of occupations across the dividing line between non-graduate and graduate jobs.

International picture

We have highlighted Britain's experience here primarily because of the availability of skills utilisation data over a substantial interval of time, long enough for a trend evolution of graduate jobs to emerge. But there is no reason to expect Britain's experience to be unusual. The relation of educational expansion with the profound spread of professionalism across occupations and thus growing skill levels within jobs is likely to be shared across developed countries (e.g, Baker, 2009; Teichler, 2009). We now, therefore, pose the question as to whether different countries deploy graduates in similar ways, and whether there is a similar pattern across countries in the growth of graduate jobs.

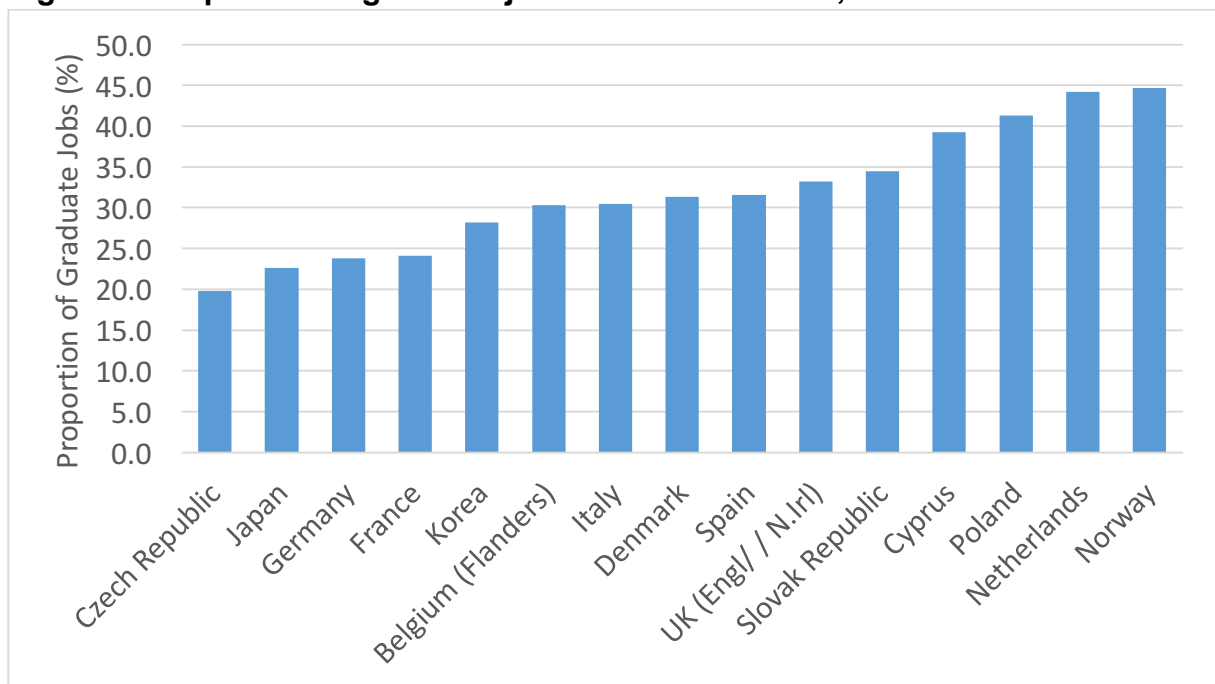
Figure 5 displays the prevalence of graduate jobs in several high-income countries. These countries are selected by data availability: they are those that entered into the first round of the PIAAC study, carried out in 2011. What is most striking about this picture is the range – from 20 per cent in the case of the Czech Republic to 44 per cent in the case of Norway.⁶

At first sight this variation might seem inexplicable, and even call into question the utility of the concept of graduate job. The variation bears no obvious relation to countries' levels of development: there are affluent countries both at the high end of spectrum, such as the Netherlands and Norway, and at the low end, like Germany and Japan. Yet, as noted above, for many high-skilled jobs there are different

⁶ Note that the UK figure applies only to England and Northern Ireland, because Wales and Scotland did not participate in the Survey of Adult Skills in 2011. The figure is also not directly comparable with the analysis of graduate jobs based on EU-LFS data, because the here-deployed classifier defines adequate employment more narrowly for higher education graduates (ISCED5A and ISCED6) only, thus leaving out high-level tertiary qualifications (ISCED5B).

educational pathways and qualifications that employers can choose from. In the case of Germany, for example, it is well-known that the "dual system" produces many high-skilled apprentices, including many who had at school obtained a university entrance diploma. Thus, some jobs which in other countries might require the deployment of college-educated labour are filled by academically able vocationally-trained labour who are not classified as having had tertiary education. The German higher education system has been struggling to adjust to new demands created by the drive towards mass global higher education, partly due to its institutional heritage and also as a result of declining real funding per student (Baker and Lenhardt, 2008). Compared with other western European countries, total expenditure per student is average and the system does not carry the same international reputation as the German vocational training system: so the quality of Germany's higher education graduates *relative* to that of people who have been through the national vocational training system is thus low.

Figure 5 Proportion of graduate jobs across countries, 2011



Source: Henseke and Green (2016, p.28).

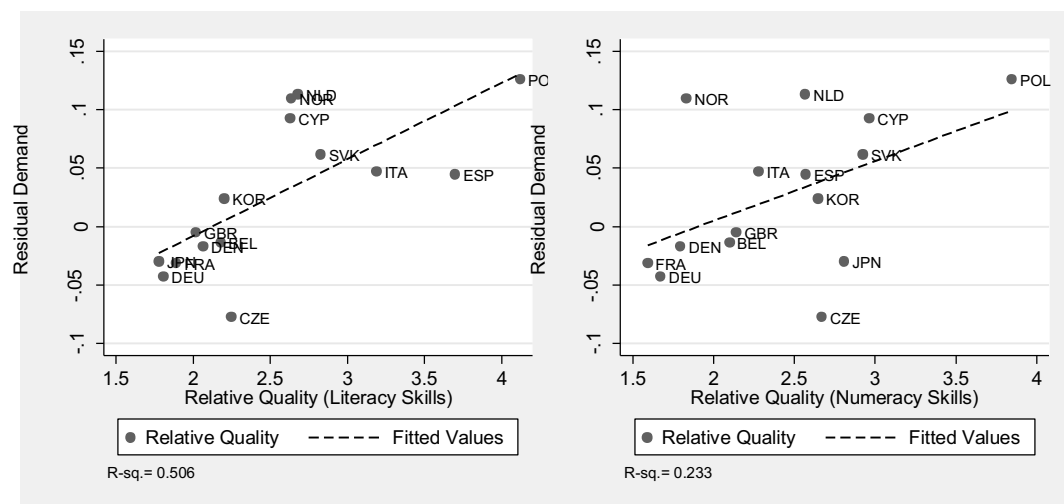
A further factor behind international variation in graduate jobs is expected to be the different industrial structures of nations, often associated with differing levels of development. To test the relative-quality explanation about the international variation of graduate jobs more formally, we first computed a "residual demand" for graduate jobs, by first controlling for the different industrial structures.⁷ We then needed some proxy indicators of the quality of different educational routes across countries. In

⁷ Within the pooled PIAAC micro-level data, we regressed the graduate job indicator on 2-digit industries, workplace size bands and a full set of interaction terms between both. Next, we calculated the predicted proportion of graduate jobs by country and subtracted the predicted from the actual value. We describe the difference as "residual demand".

Henseke and Green (2016) we used, for this purpose, the average skill levels in literacy and numeracy of the people emerging through higher education and vocational routes, as measured by the PIAAC Survey of Adult Skills. This indicator is only an approximate gauge of relative quality, not least because it only covers generic core skills, while both routes would be expected to be generating a broader range of competencies.

As can be seen in Figure 6, taken from Henseke and Green (2016), a simple cross-plot of the proportion of graduate jobs against relative quality reveals the expected positive relationship. In Poland, for example, the literacy skills of university-educated labour are (relatively) especially high, but in Germany, France and Japan they are low.

Figure 6 Relative demand for graduates and relative core skills of graduates



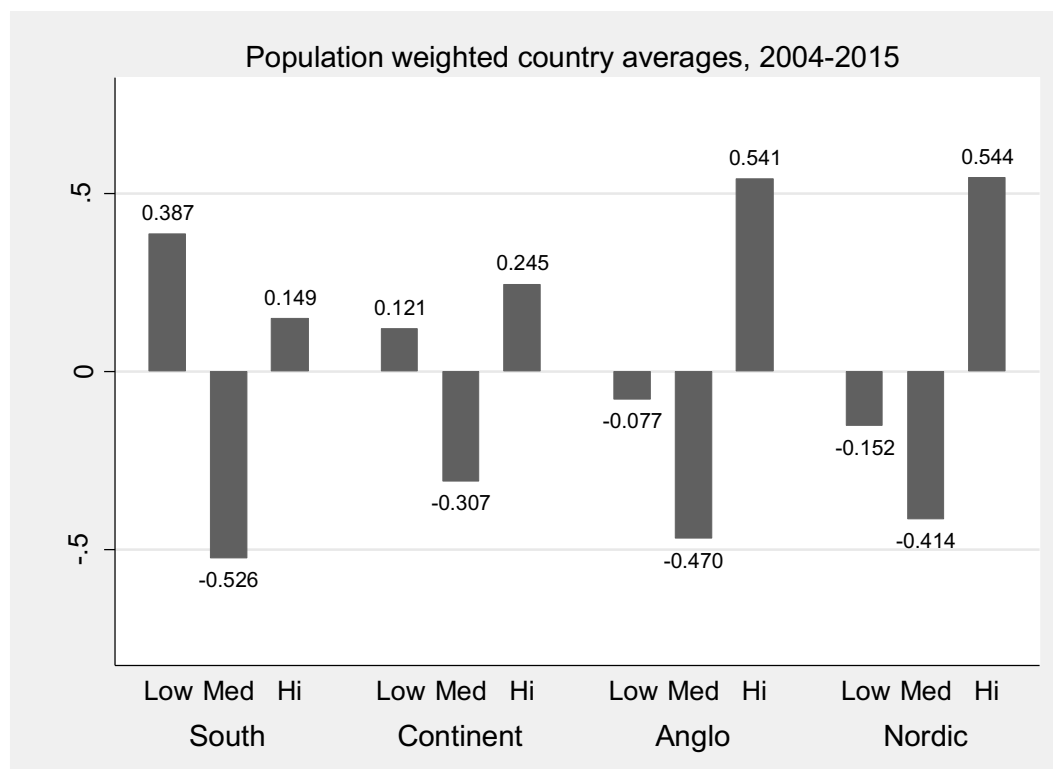
Source: Henseke and Green (2016, p.30)

It is more problematic to trace the time trend in graduate jobs across several countries, because the Survey of Adult Skills has, to date, only been carried out once for most countries.⁸ Accordingly, for this purpose we deploy an occupation-based indicator of high-skilled jobs, defined for this purpose as workers in any of the first three occupational major groups: Managers, Professionals, and Associate Professions. Using the European Labour Force Survey we can trace the evolution of jobs in each of three occupation-defined groups: high-skilled, intermediate-skilled and low-skilled. For the purpose of this analysis, middle-skilled occupations comprises Clerks, Skilled Agriculture and Fishery workers and Craft & Related Trades Workers. Low-skilled occupations include Elementary Occupations, Plant & Machine Operators and Assembly Workers, Service Workers and Shop & Market Sales Workers.

⁸ In work in progress, we trace the evolution of graduate jobs in Germany using national-specific data. A repeat cross-section survey of PIAAC countries is planned, with the prospect of examining change over roughly a decade for a much larger range of countries.

As Figure 7 shows, across all country groups, job polarisation has further continued. Between 2004 and 2015, employment has shifted away from intermediate skilled occupations towards high and low-skilled occupations. This continued erosion of intermediate skilled jobs reflects an evolving hourglass economy with fewer employment opportunities in classic middle class jobs. A small part of the shift towards high skills also reflects a re-allocation of a few job titles into high-skilled major occupation groups in the most recent revision of the International Standard Classification of Occupations.

Figure 7 Patterns of polarisation, 2004-2015



Source: EU-LFS. Own Calculations. Population averages within country clusters

Note: Occupation grouped by skill level into a cluster of high-skilled occupations (Managers, Professionals, Associate Professionals), intermediate-skilled (Clerks, Skilled agriculture workers, Craft & Trades workers), and low-skilled occupations (Elementary occupations, Plant & machine operators and assembly workers, Service workers and shop & market sales workers)

But despite similar exposure to global demand drivers such as ICT and globalisation trends, there are differences in job polarisation patterns across country groups – notably in the growth of high-skilled employment. In southern Europe, the employment share of low-skilled occupations grew the most, followed by high-skilled occupations. The continental European countries had an overall more stable employment structure. Employment grew both at the bottom and the top of the skills distribution, with growth in the latter outstripping growth in the former group, but compared to the other country clusters patterns were more muted.

It is in the Anglo and Nordic country cluster where the share of high-skill employment has grown fastest. In both country groups, high-skill employment grew on average by more than half a percentage point a year. At the same time, the proportion of low-skilled and intermediate-skilled occupations declined.

In *all*, high-skilled occupations have grown in western Europe in the 21st century though at different paces across country cluster. This suggests that, despite access to the same technologies and general demand drivers, there are country specificities in the way that the global economy shapes the national demand for high-skilled labour.

Can we plot a future for graduate jobs?

We have seen so far that the prevalence of graduate jobs is surprisingly varied across countries, even among those with similar levels of development. One explanation for this variation lies in the relative quality of graduates compared to alternative sources of high-skilled labour. As for the recent trend, the proportion of high-skilled jobs has been increasing much more in the Anglo and Nordic countries than elsewhere.

What, however, of the future? When predicting the future supply of graduates, the two key ingredients were the future of tertiary enrolments and the continuity of the lifecourse as young workers replaced retirees, and both these elements allowed us to be confident in knowing the future direction of change. We can even be reasonably sure that the expansion will continue at a healthy pace in some countries for many years. Forecasting the future for graduate jobs, by contrast, is much more difficult. For that, the main two relevant elements are future broad economic trends and the co-evolutions of technology and work organisation which map the economy onto the demand for high-skilled labour.⁹

Both elements are subject to considerable uncertainty. For the economy, it is typically assumed that economic growth will persist as long as labour forces grow and the pace of innovation will not slow down substantially, but there are uncertainties ahead such as population ageing, continued globalisation, climate change, the long-term consequences of growing public and private indebtedness, and the possible implications of AI-technologies for innovation production (e.g., Fernald and Jones, 2014; Gordon, 2014), that have the potential to limit long-term growth of the high skills demand. Recent history has also painfully reminded us that supposedly temporary economic fluctuations can develop into periods of secular stagnation with persistently sluggish growth (Summers, 2015). Though the IMF World Economic Outlook from January 2017 projects stronger economic activity in

⁹ A further element is the relative quality of college and vocational routes to high-skills, which could also change over time, thereby influencing the deployment of tertiary-educated workers.

2017 and 2018 than in 2016, risk factors such the trade policy stance of the Trump administration, slowing economic growth in emerging markets, the uncertainties of "Brexit"¹⁰ and other political developments across the world that aim to curb cross-border economic integration create large uncertainties around such projections (IMF, 2017). For the mapping of industrial demand into high-skilled labour demand, economists are troubled by forecasts of accelerating automation in the current era, generalised to include the displacement of high-skilled jobs hitherto deemed unreplaceable by machines (e.g. Arntz et al., 2016; Frey and Osborne, 2017). We do not know what the pace of innovation will be.

In this light, it is scarcely advisable to indulge in quantitative guesses about the future trend for graduate jobs. Rather, we would advocate the utility of understanding the present as well as possible, including a close annual monitoring of the prevalence of graduate jobs wherever the data is available.

5. Graduate underemployment

Barrister or barista?

One of the concerns of graduate labour market pessimists is that graduate underemployment (graduates working in non-graduate jobs) is becoming more widespread in the current era.¹¹ Common occupations where underemployed college graduates are found across the selected 16 European countries include Clerical Support Workers (e.g. general and keyboard clerks), Service and Sales Workers (e.g. models, salespersons and demonstrators), and in a few countries also Craft and Related Trade Workers¹²: not the lowest paid but assuredly not graduate jobs. There is certain to be some graduate underemployment in an economy, but the extent is expected to vary, reflecting a combination of skill match imperfections and macro-disequilibrium. When workers are poorly matched to jobs, we will have both graduate skill shortages and graduate underemployment simultaneously in different sectors or regions of the economy. Where the overall number of graduate jobs falls behind the growth of graduates, there could be a generation-long period of adjustment before market signals bring about a move back towards an equilibrium – in other words, a state of long-term disequilibrium. If the prevalence of underemployment is rising it is more likely to reflect a worsening disequilibrium than a deterioration of the efficiency of skill matches in the labour market.

¹⁰ In May 2017 the Association of Graduate Recruiters reported an annual 8 per cent decline in the number of graduate vacancies – the first fall in four years.

¹¹ Underemployment is sometimes referred to as "overeducation", but the problem with that term is that it assumes that the only purpose of education is employment, and can be pejorative.

¹² The proportion of college-graduates in this major group is particularly high in Austria, Germany, and Switzerland where tertiary education includes master craftsman who traditionally operate in this range of occupations, pointing towards the difficulties of constructing commensurate international classifications.

Graduate underemployment matters for those concerned because they receive lower pay and tend to be dissatisfied with their work, not least because they are not using their skills. Unfortunately, underemployment is for some graduates highly persistent – though not fully conclusive, some studies show that non-graduate employment spells can result in dead end jobs with limited career prospects (Mavromaras et al., 2012; Nunley et al., 2016). Thus underemployment embodies part of the risk for all when they invest in college education: there may be an adequate average return, but the downside has to be considered, especially when the investment entails taking on substantial debts underwritten by taxpayers. Underemployment should also be a concern for governments concerned with the fiscal costs of tertiary education and the social returns.

It should be noted that underemployment does not correlate perfectly with underutilisation of skills, and that not all graduates are of similar skill. Unsurprisingly, graduates with lower skills are somewhat more likely to find themselves working in non-graduate employment (Green and McIntosh, 2007; Chevalier and Lindley, 2009). Those graduates have been described as only "apparently" or "formally" underemployed. However, the causation may also be reversed: rather than being in a lowly job because they are low skilled, their skills may have atrophied as a consequence of their employment in jobs that offer less scope for learning. Whatever the reason for some graduates being underemployed and with lower skills than other graduates, they will still endure the financial risks noted above.

Moreover, skill differences account for only a fraction of the underemployment found in many countries. Those who presume that *all* graduate underemployment could be explained away by skills heterogeneity are committing the common "part to all" fallacy: just because some heterogeneity exists, that does not imply that all underemployed graduates are less able than graduates in matched jobs. Nor does it mean that the distinctions between graduates and non-graduates, or between graduate jobs and non-graduate jobs, can be dissolved.¹³

In the light of the trends in the graduate labour supply and in graduate jobs, we therefore next ask: do the graduates of different countries experience underemployment to a similar extent, and is there a varied pattern of change over time?

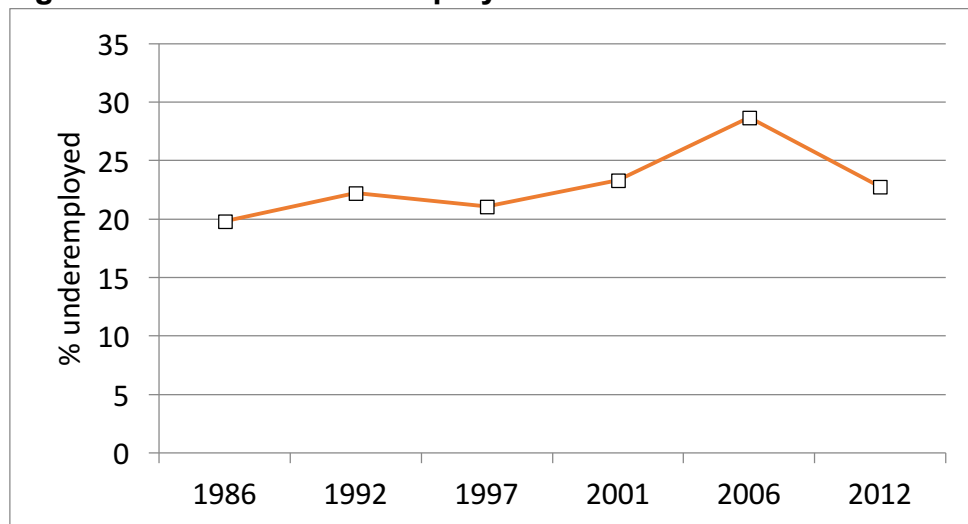
Trends in graduate underemployment

We have, unfortunately, only a very patchy picture of the growth of graduate underemployment in the modern era. Considering the importance of this phenomenon to so many people, we find this rather surprising.

¹³ Several writers have focused their analyses on subjective indicators of skills mismatch. While this approach has some potential appeal, there is no consensus, as yet, on an adequate indicator for skills underutilisation.

To gain an adequate picture, we need successive representative cross-sections of an economy with identical measurement protocols. Again, Britain is one of only a few countries with useful data. Using data from the Skills and Employment Surveys, an individual graduate is deemed to be underemployed if he/she is in a job for which the highest qualification required (at the time of the survey) by someone to get the job is below tertiary level. Figure 8 shows how underemployment has evolved over a long-term: it steadily increased until 2006, then fell partially back, following a surge of employers upgrading their skills requirements. In Green and Henseke (2016a) we found something similar with the later British data. Using our indicator of graduate jobs, we deemed a graduate to be underemployed if he/she was in a non-graduate occupation. Between the pooled 1997/2001 data and the 2006/2012 data the extent of graduate underemployment grew only marginally from 29 percent to 31 percent.

Figure 8 Graduate underemployment in Britain 1986-2012



Source: authors' analysis using the British Skills and Employment Surveys.

In short, while there was a long-term rise in the past, looking at the present century the picture for underemployment in Britain has been "so far so good". In other countries, the only published information (of which we are aware) about change, using consistent measurement protocols, concerns not just graduates but workers at all education levels. In Germany there was a steep rise in underemployment from 17 per cent to 34 per cent of the employed workforce between 1991/2 to 1998/9 (Rohrbach-Schmidt and Tiemann, 2011); in Poland, underemployment rose from 8 per cent in 1988 to 19 per cent in 2008 during a period of sharp transition (Kiersztyn, 2013); while also in Sweden underemployment rose substantially between 1974 and 2000 (Korpi and Tåhlin, 2009).

What, then, can be said about graduate underemployment with the international data to hand? In Figure 9 is shown the distribution of the prevalence of graduate underemployment across OECD countries, as adapted from our calculation in Green and Henseke (2016a) based on the PIAAC Survey of Adult Skills data.

There is an astonishingly large range, from just 10 per cent in Finland to nearly a half in Japan. And while the skills competencies data from the survey showed some tendency for the underemployed to have lower competences than graduates who were employed in graduate jobs, this heterogeneity accounted for only a small amount of the underemployment in each country, and none of the large differences between countries.

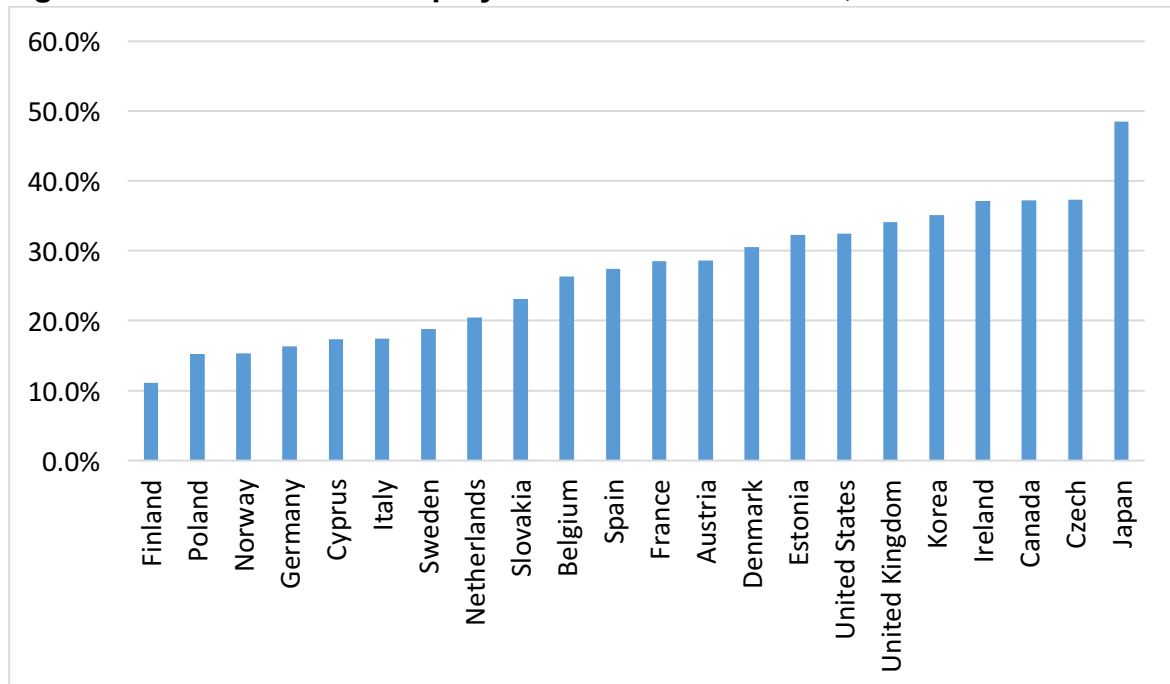
Underemployment might complement or substitute other forms of graduate underutilisation, such as unemployment or non-employment of graduates. To examine this issue, Figure 10 uses the European Labour Force Survey data to study the disposition of college-educated labour in a wider range of countries within Europe, between high-skill, medium skill, low skill occupations and joblessness. High-skill occupations are again defined as jobs that fall into major groups 1 to 3. As can be seen, there is also a considerable range in the proportion of graduates who find themselves in these occupations, from Norway where 4 out of 5 graduates are in these occupations, to Greece where only a half of graduates find high-skill employment. This figure also shows that underemployment tends to be higher in countries where graduate non-employment is higher.

What might account for the cross-country variation in graduate underemployment? While no simple classification accounts for this range, we see from Figure 9 that Anglophone countries Canada, Ireland, the UK and the US are concentrated at the upper end of the spectrum, while most Nordic countries are in the lower half. Whether the constellations of labour market and educational institutions might contribute to differentially efficient skills matching in these country groups is thus suggested as a possible explanation in need of investigation. Another proximate factor is the country-level gap between the prevalence of graduate jobs and the supply of graduates – what might be termed the "relative demand" for graduates. Verhaest and van der Velden (2013), using a different measurement protocol and earlier data, find evidence in favour of this explanation.¹⁴

Using our data, Figure 11 shows a simple cross-plot of the proportion of graduate underemployment against the relative demand. It indicates that those countries with high levels of underemployment do indeed tend to be where the relative demand is low. This 'account' is, of course, no more than a proximate explanation, begging the question of what determines relative demand. Nevertheless, the plot is not simply mechanical. Underemployment arises both from any aggregate imbalance between graduates and graduate jobs, and also from the efficiency with which they are matched at the micro level. The plot indicates that variation of the aggregate imbalances is a major part of cross-country differences.

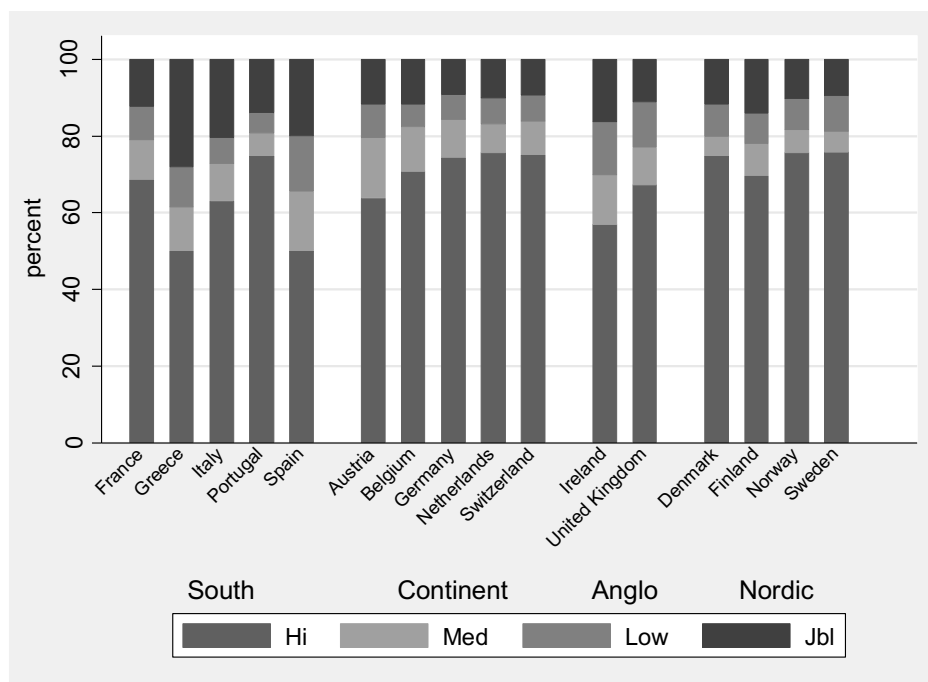
¹⁴ Verhaest and Van der Velden also add, as part of their account, significant roles for the quality and orientation of education systems, and the stage of the business cycle.

Figure 9 Graduate underemployment across the OECD, 2011



Source: Adapted from Green and Henseke (2016b). UK is just England and Northern Ireland.

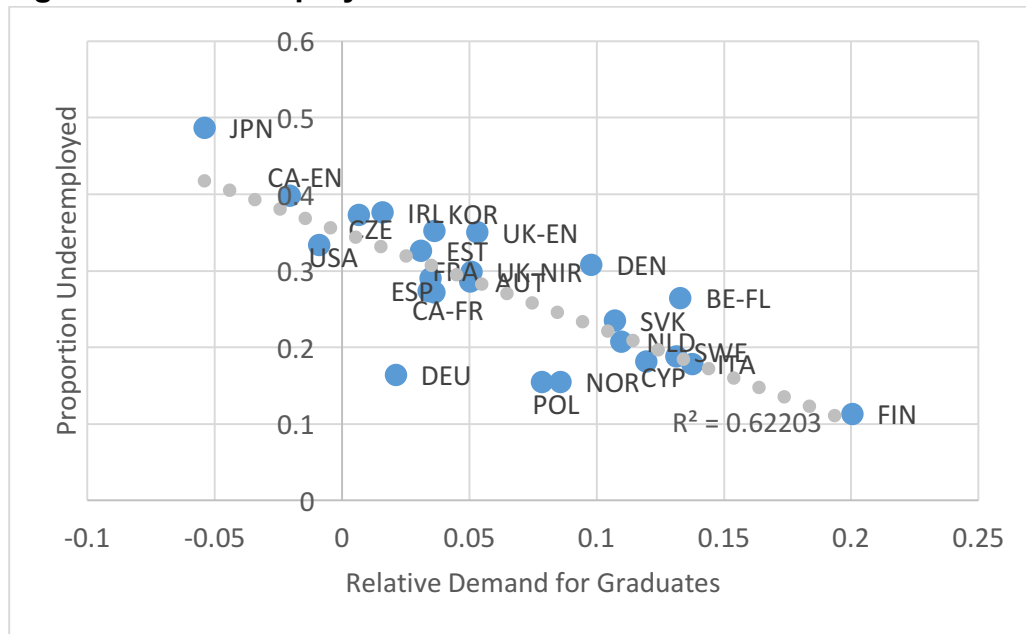
Figure 10 The labour market position of tertiary graduates (25-59 years), 2015



Source: EU-LFS. Own calculations.

Notes: As before, occupations are grouped by skill level into a cluster of high-skilled occupations (Managers, Professionals, Associate Professionals), intermediate-skilled (Clerks, Skilled agriculture workers, Craft & Trades workers), and low-skilled occupations (Elementary occupations, Plant & machine operators and assembly workers, Service workers and shop & market sales workers). Joblessness (Jbl) combines unemployment and economic inactivity.

Figure 11 Underemployment and relative demand



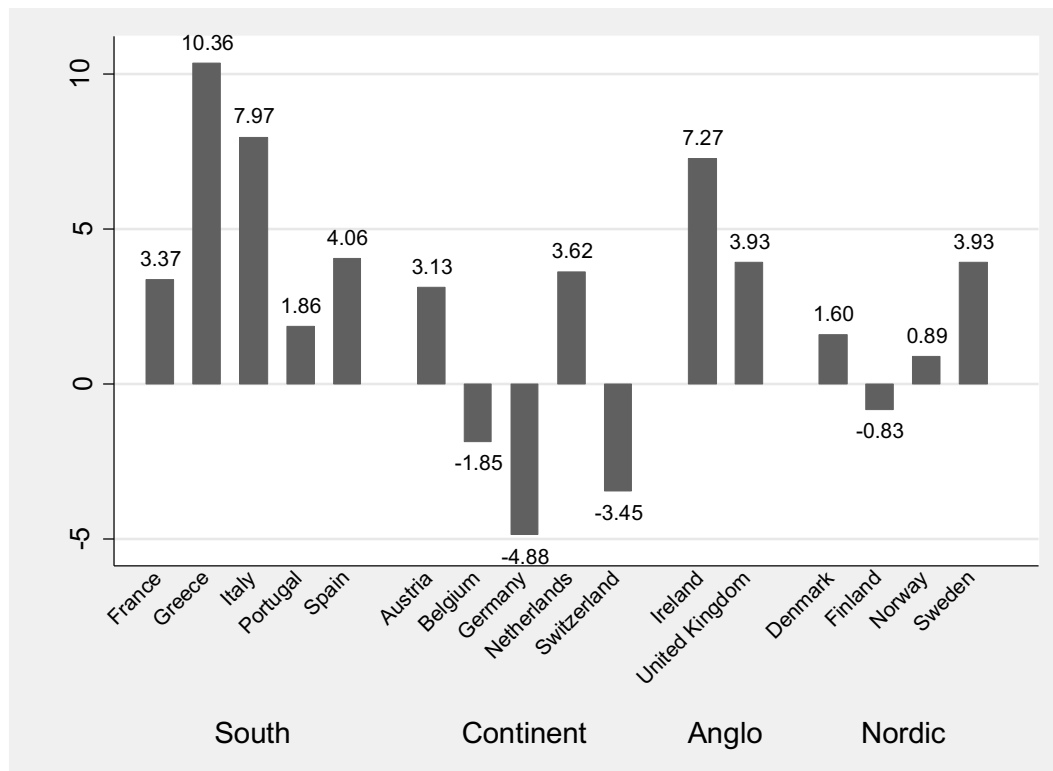
Source: Adopted from Green and Henseke (2016b)

Relative Demand is defined here as: (Share of graduate jobs in the employed labour force) - (Share of HE-graduates in the employed labour force)

If we extrapolate this simple cross-sectional account to speculate about within-country trends, what this suggests is that a country where graduate jobs are growing less fast than the growth of graduates is likely to experience increasing graduate underemployment.

To provide new evidence about trends, Figure 12 moves away from the statistical definition and measurement of graduate job derived directly from job skill data, since consistent data are not available over time. Instead, we again loosely proxy graduate employment as defined by major occupation groups 1 to 3, which allows us to look at changes in underemployment over time that result from between-major-occupation group changes using the European Labour Force Survey. Here, the alternative definition of underemployment is taken to be a graduate employed outside these top three groups.

Figure 12 The change in the proportion of employed graduates in medium-skilled or low-skilled jobs (25-59 years), 2004-2015



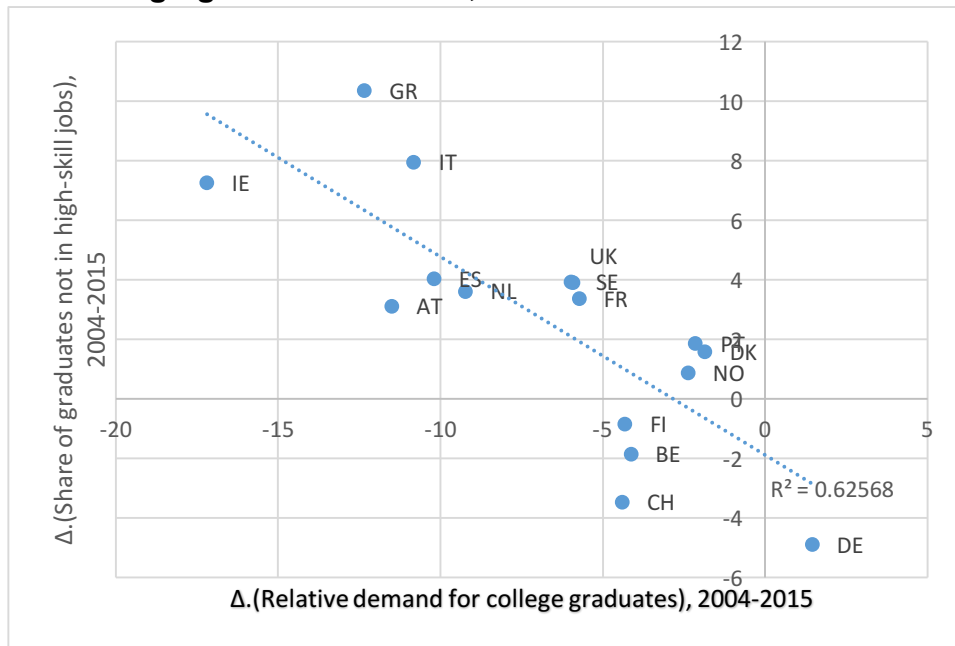
Source: EU-LFS. Own calculations.

The proportion of employed graduates in medium-skilled or low-skilled jobs is used here as a loose proxy for graduate underemployment.

Figure 12 shows a pattern of differentiation between countries. The predominant picture is one of growing underemployment of employed graduates. This tendency is strongest in the southern European countries, especially Greece and Italy, but there has also been growing underemployment elsewhere, notably in Ireland. In several countries, there has been negligible change, while in some countries, especially Germany and Switzerland, the proportion of graduates outside of high-skilled occupations has decreased.

This analysis should be qualified, in that it covers only a decade of history; some of the changes will reflect the aftermath of the Great Recession of 2008 and the subsequent financial crisis; and additional within-occupation skill changes may have occurred which may not have been adequately captured by the ISCO08 revision. Nevertheless, Figure 12 suggests that there is food here for both optimists and pessimists of the graduate labour market, depending on which country one focuses on.

Figure 13 The changing proportion of underemployed graduates (loose proxy) and changing relative demand, 2004-2015



Source: EU-LFS. Own Calculations.

What might explain this pattern of change in underemployment? Figure 13 plots the same underemployment measure against the change in relative demand for graduates over the period. This is the dynamic equivalent of Figure 11, though performed for a different set of countries and based only on our loose proxy for graduate employment. It shows that the countries where graduate underemployment has risen the most (Greece, Italy and Ireland) tend to be the ones where relative demand has fallen the most; and Germany is at the other end of the line, where relative demand rose by a small amount. The slope of the line plot is statistically significant. In effect, what this suggests is that, while the individual-level match between graduates and graduate jobs can change over time, any such changes do not mask the effect of the changing aggregate imbalances between the overall proportions of graduates and graduate jobs.

To sum up our findings in this section, there is a considerable range in the prevalence of graduate underemployment across countries, and this partially reflects the prevalence of graduate jobs in relation to the supply of graduates. Over time the predominant story is one of increases in the extent of graduate underemployment for the last decade, though such increases were by no means ubiquitous. The increases seem to have been located primarily in southern Europe and in Ireland, and in general were greatest where the aggregate imbalance between the share of graduate jobs and the share of graduates declined the most. As for the future, we have not speculated here, owing to the uncertainty about the future of graduate jobs discussed in the previous section.

6. Graduate wage trends and dispersions

As argued in our introduction, some light might also be shed on the different perspectives of optimists and pessimists of the graduate labour market by a joint focus, not only on direct measures of supplies and demands, but also on the changing distribution of the earnings premium rather than just the average premium. Potential dispersion arises owing to the changing structure of employment, especially the polarisation of employment in several countries, and to the possibility of increases in the heterogeneity of higher education institutions and in the range of prior achievements of students. Pessimism might also be associated with a general downward trend of wages in several countries, affecting both graduates and those with lower levels of education. The increased prevalence of graduate underemployment might lead us to expect increasing wage penalties from underemployment as graduates either compete downwards the wages of the intermediate jobs or are increasingly forced to take up jobs further down the skill ladder.

The dispersion of the graduate earnings premium can take a number of forms. On one hand, the premium may differ according to pre-determined socio-economic and demographic categories. On the other, the premium may vary according to the subject studied at college, the institution attended, the level attained (whether postgraduate) and the grade achieved. The dispersion of outcomes can be documented in terms of earnings or occupational attainment. One prominent manifestation of differentiation is the finding of a wage penalty from underemployment, while nevertheless graduates earn more than non-graduates even when they are employed in non-graduate jobs – a common finding in studies of underemployment at all levels (Britton et al., 2016; Walker and Zhu, 2017; Webber, 2014; Green and Henseke, 2016b; McGuinness, 2006).

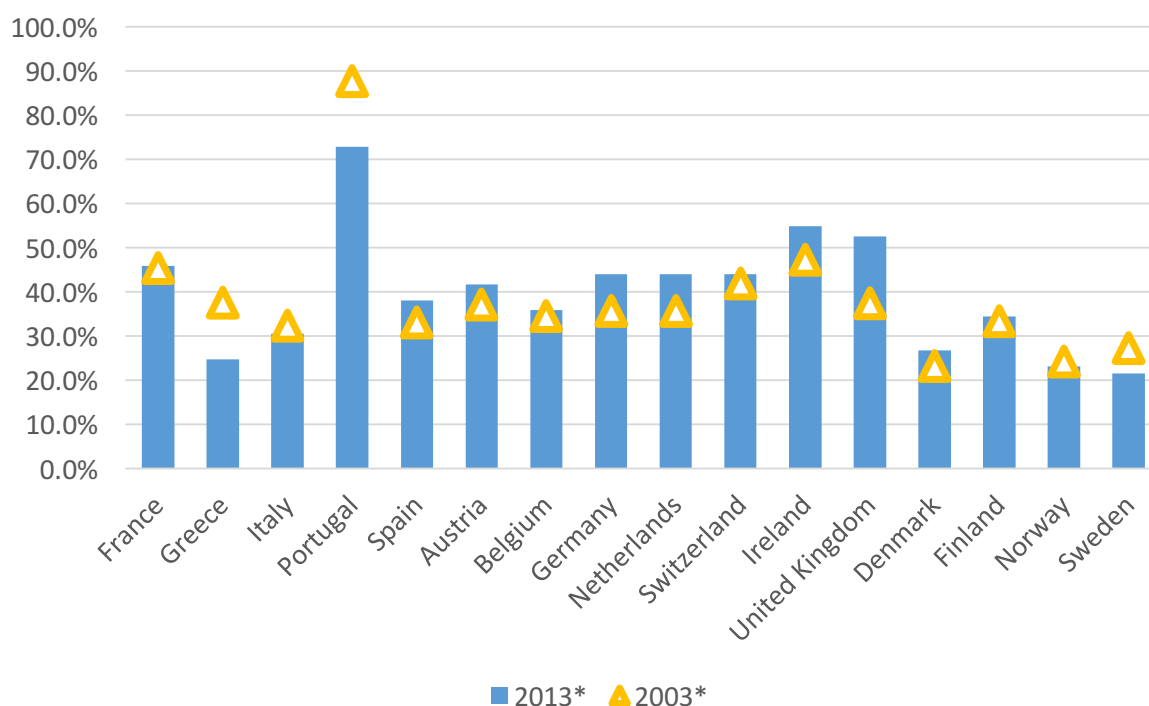
Aside from the evidence that these dispersions are present, there are few studies that examine whether there are any substantive trends in the dispersion of the wage premium. Naylor et al (2016) report an increase in the premium for achieving a top-class degree (compared with lower grades) in Britain, while others report increases in the premium for post-graduate degrees (relative to bachelor degrees) in the US and Britain (Lindley and Machin, 2014; Valetta, 2014). There is evidence of an increasing gap from 2001 to 2011 between the premium for sub-degree and degree level tertiary education in Hong Kong (Lee, 2016). There is some evidence of an increase in the wage penalty from underemployment in Britain (Green and Zhu, 2010; Green and Henseke, 2016a).

The aim of this section, therefore, is to document changing graduate earnings and the earnings premium. What is happening to the real value of graduates' earnings? Is the average earnings premium holding up in all countries? Focusing on one

particular manifestation of the dispersion, namely the wage penalty according to whether graduates are underemployed, we then ask: is there a widespread or common growth in the dispersion of this earnings penalty?

It is important to note, at the outset, that in reporting wage differentials there are important methodological challenges if one's objective is to estimate causal effects of participation in tertiary education programmes in multiple countries. Unobserved factors that determine selection into tertiary education programmes, the field of education or the quality of the institution will be correlated with life-time earnings potential and bias estimates. Moreover, measurement issues surrounding the collection of self-employed income or arising from international mobility in samples of the private residential population may by design reduce the range of income information collected in household surveys. Especially, the latter may be important given the growth of a globally mobile top-earning elite of tertiary-level graduates. In our cross-national dataset, expats' monetary gains from college education will be measured in the country of residence and not the country of origin.

Figure 14 The wage differential between tertiary and (upper-) secondary education, 2003 and 2013



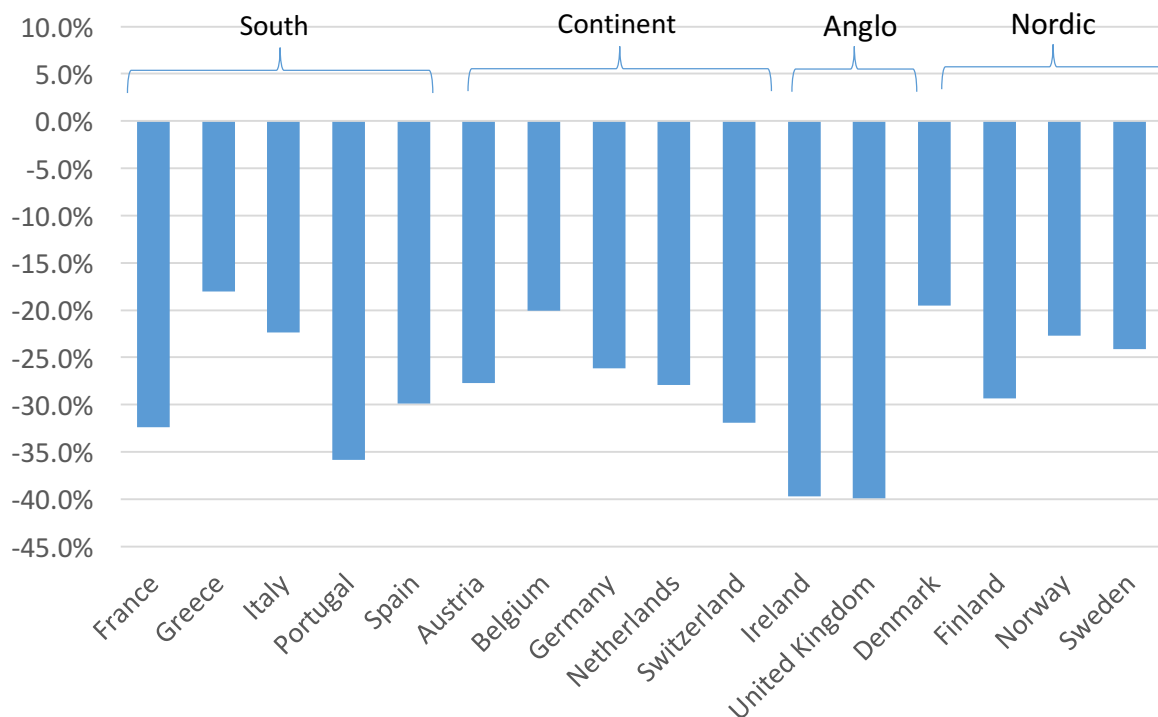
Source: EU-SILC. Own Estimates

Note: Wage differential between tertiary (ISCED5,6) and upper-secondary (ISCED3,4) education among workers between 26-59 who were in full-time employment over the 12m before the interview. 2013*: UK values from 2011. 2003*: CH (2006), DE (2005), ES (2004), IT (2005), PT (2005)

Across all 16 selected European countries and both years, tertiary graduates earned on average significantly higher labour income than workers with an upper-secondary level of education (Figure 14). The gap is relatively low in Greece and Italy as well as the Nordic countries. Though some of the variations in income differences by educational level across countries will be due to different skills gaps between graduates and non-graduates, other factors such as wage setting mechanisms will also contribute to wage differentials.

The mean differential in labour earnings remained fairly stable in most countries between 2003 and 2013. The median change in the selected countries was a 1.7 percentage point rise in favour tertiary-educated labour. Here is the prime source of evidential support advanced by graduate labour market optimists. But there are some variations. In Greece and Portugal, the earnings gap declined, whereas the UK witnessed a further growing advantage of tertiary education over upper-secondary education credentials. These findings are consistent with those of Crivellano (2016) for a slightly earlier period.

Figure 15 The wage gap between matched and underemployed graduates, 2013



Source: EU-SILC. Own Estimates

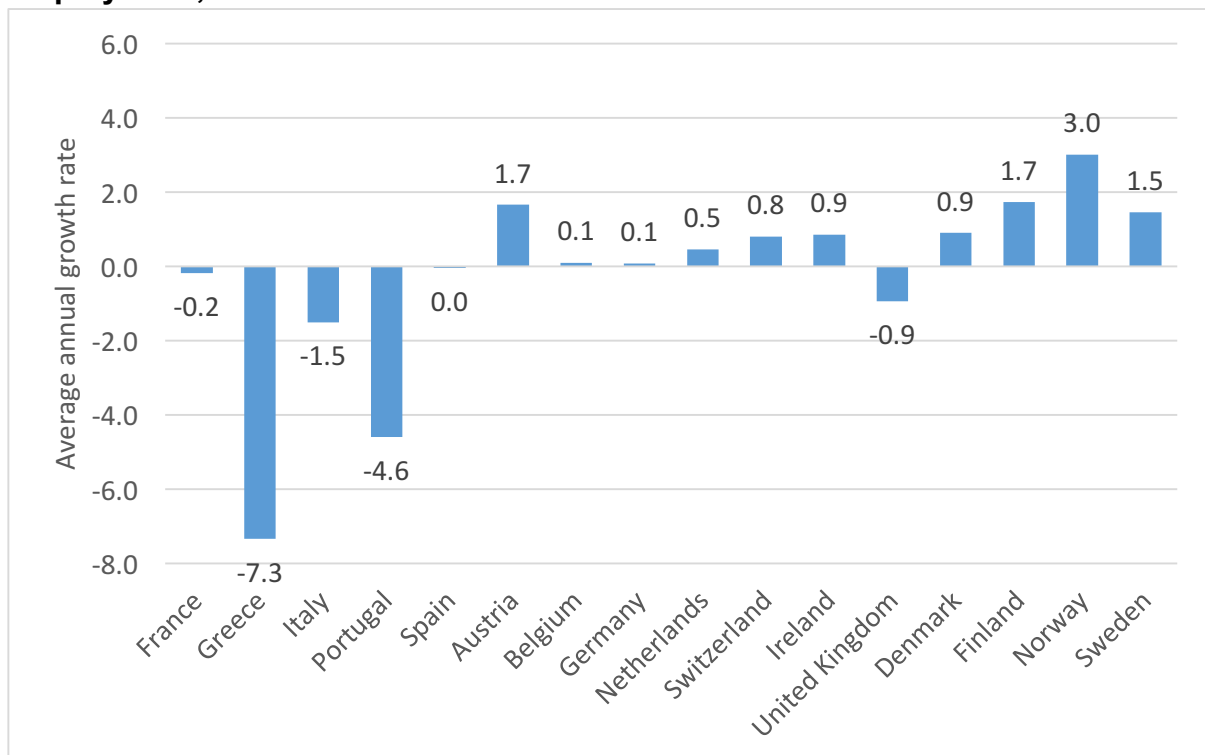
Notes: earnings difference among full-time employment 25-59 year old college-graduated by labour market position. Graduates are classified as underemployment if they worked in intermediate or low-skilled occupations. UK values from 2011

Next we turn to the dispersion of earnings *among* college-graduates, specifically in relation to their attained labour market status. Figure 15 displays the earnings penalty associated with underemployment among college-educated workers. In all countries, underemployed graduates earn significantly lower income than matched graduates. This is a well-established finding in the literature. The earnings gap was smallest in Greece, Italy, Belgium and Denmark. The Anglophone countries Ireland and Britain are at the other end of the spectrum.

An important issue for long-term individual economic wellbeing is to what degree economic growth trickles down to households and individuals. Some studies have suggested that growing proportions of the population experience real income reduction especially at the bottom of the wage distribution and in more recent years. Part of this was certainly driven by the downward pressure on wages during the Great Recession and its direct aftermath, but there is evidence from a few countries of a decoupling of real wages and economic growth that precedes the downturn from 2008 (e.g., for UK see Gregg et al., 2014; for Germany see Dustmann et al., 2014).

Figure 16 displays the average annual change in real labour income of well-matched college graduates over the period 2003 to 2013 in the selected 16 European countries. In many countries, the real wages of matched college graduates stagnated or grew only sluggishly. This contrasts with clear drops in real wages among matched college graduates in Greece, Italy, Portugal and to a lesser degree in the UK. Figures for Greece hint at the dramatic effect the financial crisis and austerity have had on living standards even for those graduates in high-skilled employment: over a 10-year period, a 7.3 per cent annual reduction of real earnings implies a drop of real income by 50 per cent in total. Only graduates in Austria and the Nordic countries saw their material position on average substantially improved. Though the figures do not seem large, small differences in growth rate will eventually amount to noticeable different income levels over time: for example, whereas real earnings of matched Dutch graduates grew by just 5 per cent between 2003 and 2013, Swedish graduates earned roughly 16 per cent more in 2013 than in 2003. However, these are average figures and thus do not account for potentially growing income dispersion within the group of college graduates.

Figure 16 The change in real gross earnings of graduates in high-skills employment, 2003-2013



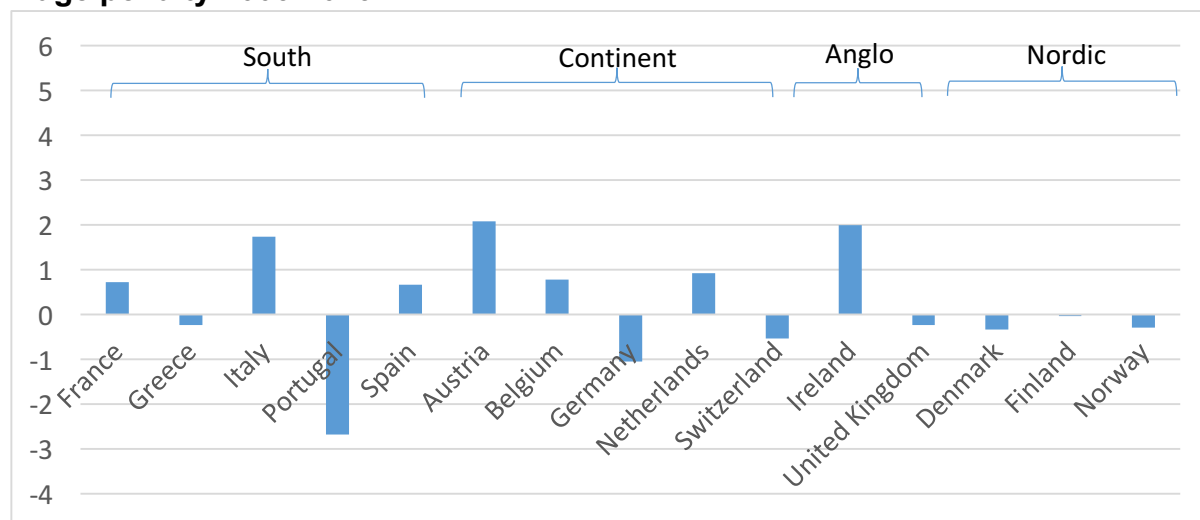
Source: EU-SILC. Own Estimates

Notes: Average annual growth of 25-59 year old college graduates who were in continuous full-time employment over the 12m before the interview. Nominal income data deflated using the Harmonised Consumer Price Index published by Eurostat. The period of observation was usually 2003-2013, with exceptions: UK (2003-2011). CH (2006-2013), DE (2005-2013), ES (2004-2013), IT (2005-2013), PT (2005-2013)

As noted in our introduction, there are reasons on both the demand side and the supply side to expect a growing differentiation among graduates. Moreover, since underemployment rates appear to be on the rise, a growing number of graduates may either slip further down the wage distribution or compete downwards with the wages of intermediate and low-skilled workers. Yet institutional factors could reduce or eliminate the increases in differentials: for example, trade unions could resist changes in differentials, or legal minimum wages could act as a floor to the wages of both graduates and non-graduates in non-graduate jobs. So, is there evidence for a growing income dispersion between matched and mismatched graduates?

Figure 17 compares the growth of real earnings between matched and underemployed graduates between 2003 and 2013 based on our analysis of EU-SILC. A positive value indicates that wage growth of matched graduates outstripped the growth rate among underemployed graduates and would thus imply a growing dispersion of income among tertiary-educated workers. Overall, the estimates do not suggest consistently rising dispersions in the wage premium associated by mismatch status. The wage penalty for underemployment grew in only a few countries: Italy, Austria and Ireland, but shrunk for example in Germany.

Figure 17 Growing heterogeneity? Trends in the graduate underemployment wage penalty 2003-2013



Source: EU-SILC. Own Estimates

Notes: Restricted to employees aged 26-59 who have been in full-time employment over the 12 months before the interview. The figure displays the Average earnings growth rate of graduates in ISCO1-3 minus average earnings growth rate of graduates in ISCO4-9. The period of observation was usually 2003-2013, with exceptions: UK (2003-2011). CH (2006-2013), DE (2005-2013), ES (2004-2013), IT (2005-2013), PT (2005-2013)

In sum, what we have found is a mixed picture for graduates' earnings across Europe. In real terms graduate earnings have been declining in some of the southern countries, while they continued to rise in Nordic countries. Across most countries, the average graduate earnings premium, relative to workers with upper secondary education, has remained largely stationary, exceptions being Portugal and Greece where it declined markedly in both places. We found some evidence of a rising earnings penalty in Austria, Ireland and Italy, but surprisingly none elsewhere. These last two countries, it may be noted, are also places where the prevalence of graduate underemployment increased.

7. Implications and ongoing research

Clouds on the horizon?

We have described a mixed picture of positive and negative developments in the graduate labour market. One reason for the clash of optimism and pessimism that one finds in public and academic discourse could simply be that the story differs from one country or region to another, and that it is possible to be hopeful about some places, while pessimistic about others. A more likely explanation, however, is that writers from different perspectives put different weights on the various parts of the evidence. The level of graduate underemployment, and its potential for growth, are matters of concern for many, while some economists discount that evidence,

preferring the (claimed) objectivity of the wage premium findings as evidence of what employers are prepared to pay for the extra skills and hence extra productivity of graduates.

In addition to the fact that average premiums have been holding up in most countries, there are wider reasons for optimism. We are living through a remarkable educational transformation in which, steadily, it is becoming the norm for a substantial proportion of successive age cohorts in all countries to be educated to tertiary level. The pressures to increase participation appear to be deeply embedded in populations, and are now entrenched across generations. Across populations a young-old achievement gap is ubiquitous, and there is a consequent ongoing rise in the supply of graduates, even if there is no strong convergent tendency as yet. Whether or not graduates are suitably employed, the social returns from their education can be expected to be high (McMahon, 2009) and a more educated population should be lauded.

In the last decade, there are also reasons for some comfort from the evidence on graduate jobs. In Britain, the late 2000s saw a considerable rise in the proportion of graduate jobs, almost equalling the pace of increase in the graduate labour supply. While this may have led to a pause in the long-term rise in graduate underemployment in Britain, we also found that in at least some other countries – notably the Nordic countries – the share of high-skill jobs also rose in the last decade. As for the future, while this is uncertain, there are some writers who point to the ongoing rates of innovation, and who expect that the processes of innovation – in research, development, application and dissemination – will themselves extend the demand for graduate labour (Autor, 2015).

Other commentators are far more pessimistic about the future for graduate labour markets. Stoking this pessimism is the uncertainty surrounding the future for graduate jobs, noted above. In Ireland and in southern Europe more generally we found a rise in the proportion of graduates working in less than high-skilled jobs. Unable to forecast with any ease or confidence the medium-term trends in the economy, and even more so the future trend in high-skills labour demand, commentators must extrapolate from the latest trends, and supplement this wisdom of the present with expertise on the new technologies that are expected to be rolled out over the next few years.

One striking development, from which some extrapolation might be made, is the evidence of stagnation, and even back-tracking, in the evolution of high-skills demand in the United States. Attention is drawn to the fact that there has been a "great reversal" in the growth of US employment that involves intensive use of cognitive skills (Beaudry et al., 2016), and that the earnings premium for college-only educated labour stopped growing in 2010 (Valetta, 2016). Beaudry et al. (2016) explain the changes as a shift away from middle-skilled occupations and a generalised reduced demand for advanced cognitive skills (even within high-skilled occupations). They see this as reflecting the maturity of the IT revolution – a typical

stage of a general-purpose technology which diffuses almost all sectors of the economy. In the early and main stages of the diffusion of IT technology, the demand for highly-educated workers was stimulated because it needed well-educated workers to creatively use and deploy the new products and processes made possible – a manifestation of skill-biased technological change. In the later stages, however, such usage is reduced and the norm is the displacement of more routine skilled tasks. In sociologists' terms, digital Taylorism becomes the prevalent form of labour process control (Brown et al., 2011).

Layered on this pessimistic perspective is the argument of technology writers that we are entering a new and radical phase of automation. Most of the increased automation risk seems to be still at low skill levels, with routine cognitive and manual tasks becoming more universally replaceable by robots and machine learning. Nevertheless, some high-skilled tasks, traditionally performed by graduates, are said to be also becoming open to displacement (Gibbs, 2017). The potential of this new wave of technology to affect different forms of employment remains unclear and controversial. While Frey and Osborne (2017) estimate that 47 per cent of the US workforce is deployed in jobs that could be automated soon, Arntz et al. (2016) derive a much smaller proportion – nine per cent – of jobs at high risk of automation. As in the past, automation is likely to continue to substitute for labour in certain tasks but it will also complement the performance of other tasks and thus raise productivity and the demand for labour (Autor, 2015). Estimates for the United States show that robots have had substantial effects on employment during the 1990s and 2000s in the industries where they were introduced (Acemoglu and Restrepo, 2017). What remains unclear is how these processes will evolve and what skill sets will “win” the race.

Nonetheless, if the recent history of the demand for high-skilled labour in the US is a harbinger for Europe, or if the fears of technology analysts for the future of work come to be focused more on high-skilled work than hitherto, then the prospects of ongoing rises in the prevalence of graduate jobs seem limited. To this mixture can be added more short-term anxieties about the future of the global economy, fuelled by sluggishness in recovery from the economic crisis of 2008, by declines in living standards for the mass of workers in many western countries, and by the uncertainties in Europe following Britain's planned exit from the European Union. Set against a graduate labour supply which is expected to rise inexorably for the foreseeable future, albeit at an uneven and non-convergent pace across countries, the prospects for a successfully employed and contented graduate workforce in the coming decade look far from rosy.

In our view, the most likely scenario for the coming decade in the majority of developed western countries is for an increase in the prevalence of underemployment among graduates – in effect, a continuation and broadening of the tendency hinted at in Figure 12. In the face of such underemployment there may be some slowing in the pace of higher education expansion, but it is in the nature of the higher education market, with its long-term returns, that any such adjustments take

place over very long intervals, with substantive disequilibria in the meantime. If the expansion of higher education does slow down, underemployment may not reach the levels now being seen in some Eastern countries, for example South Korea, where the drive towards higher education enrolment has been especially fervent. But it seems probable that western governments are going to have to get used to the sight of the graduates performing apparently lowly jobs on a permanent basis.

Would growing graduate underemployment be a problem? With current financing arrangements in most countries – that is, students having to fund their way through college through loans, if not able to be supported by parents – the answer to this question would seem to be a resounding yes. What evidence there is suggests that graduate underemployment is quite persistent: that is, once stuck for any period of time in a non-graduate job it is hard to break out. Underemployment is known to be strongly associated with job dissatisfaction, and there are occasions when this dissatisfaction may break out into disillusion with higher education. There are concerns that an over-extension of higher education in East Asia has already led to increases in inequality, rather than the decreases expected (Mok and Neubauer, 2016). The financial risk that, once graduated, one will fail to find a job which pays high enough, especially in the face of debt, looms large for modern students across Europe. While there may be very different fallbacks for underemployed graduates across Europe as one ranges across welfare regimes, in every case the risk of underemployment (or, worse, unemployment) has become a fact of life for many of today's youth, and could become the norm if the worst fears of the technology experts are realised.

On the other hand, there should be clear external benefits for the rest of society from having an increasingly educated population, and the experience of life at college is manifestly not just about learning academic knowledge or acquiring employability skills. In Green and Henseke (2016b) we found evidence, moreover, that college education is associated with certain external benefits – notably civic participation, volunteering and social trust – even when graduates are unable to find work in graduate jobs. Higher education is also known to be beneficial for an individual's health, something that has both private value and additional external benefit for the rest of the population.

Coda: Our future work

In presenting this multi-dimensional picture of graduate labour markets in Europe, this paper has set out the store for the rest of our research under project 2.3 of the Centre for Global Higher Education over the coming two years. If readers have observations on specific countries relevant for this paper, their comments are welcome.¹⁵

We have advocated a complementary approach, in which attention is paid both to explicit measures of demand and supply, and to the wages and premiums associated with being a graduate in today's European societies. In addition, there is a pressing need to extend research on graduate underemployment to cover social as well as private returns, hence whether and to what extent there is a social benefits penalty as well as a wage penalty from being underemployed or being at the low end of the wage spectrum. Attention needs to be given to the methodological issues of measurement error and selection bias. Subject to these caveats, in our future work we shall be studying dispersion in the economic and social returns to higher education mainly in Europe, extending our findings where the data allow to more countries, including those in Eastern Europe, and considering the role of economic and institutional factors in explaining the patterns of differentiation.

¹⁵ Please send to g.henseke@ucl.ac.uk. We would also welcome reference to relevant country-specific studies that we have not already noted, including unpublished studies.

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