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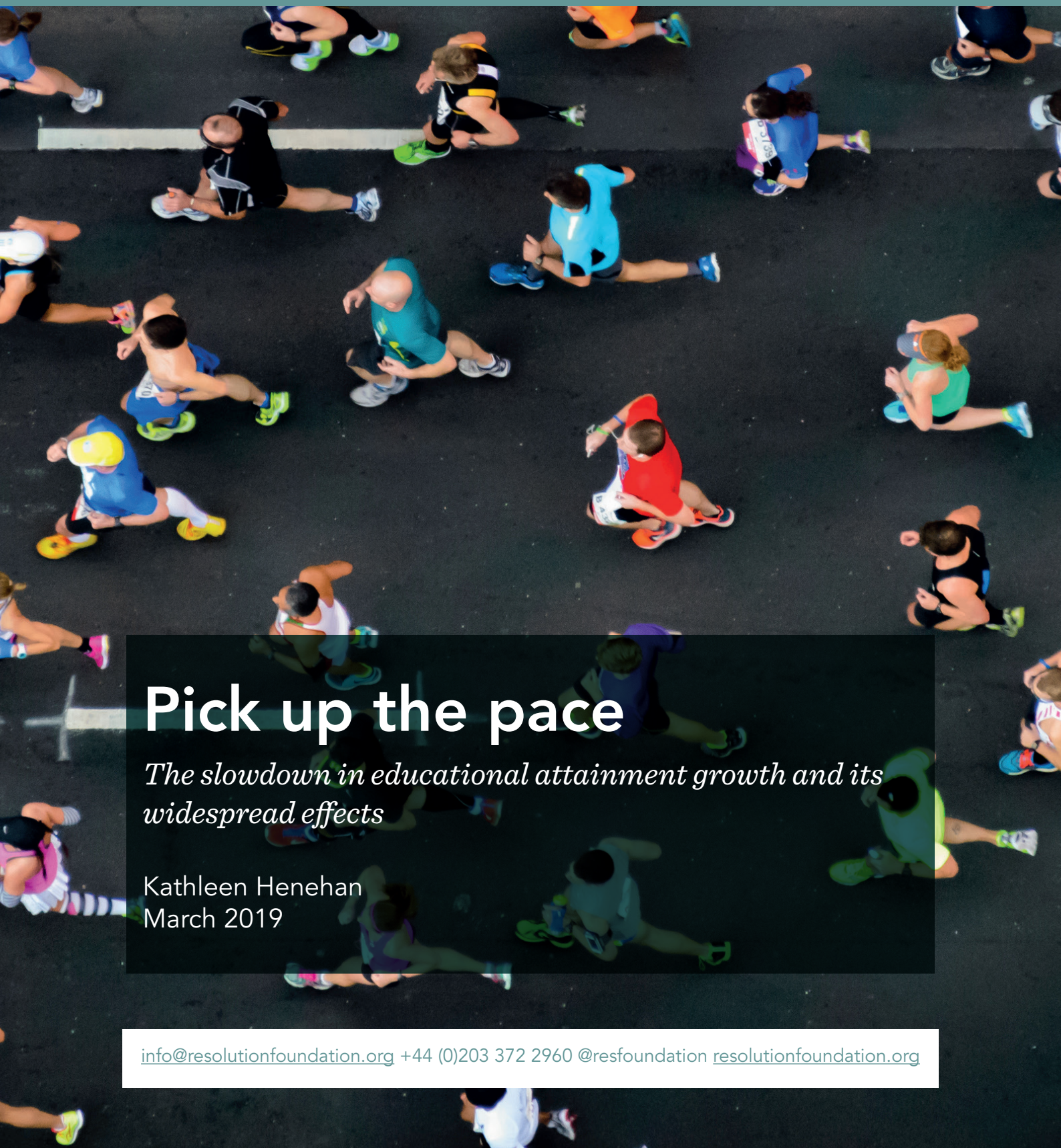

Pick up the pace

The slowdown in educational attainment growth and its widespread effects

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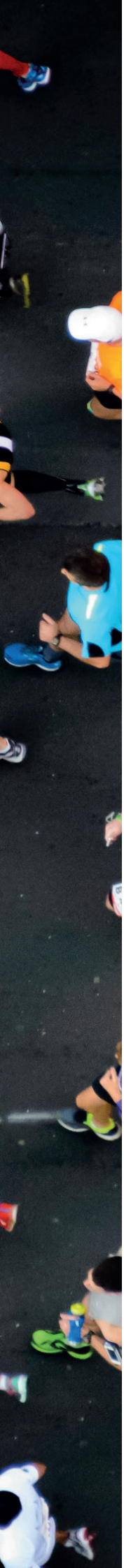

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Executive Summary

The UK's exit from the European Union has ignited a debate on its skills opportunities and challenges, making now a good time to take stock.

As Britain's exit from the European Union nears, questions about the country's access to skills have come to the fore. Some have argued that 'turning off the tap' of migrant labour will bring with it challenges, by denying businesses access to the skilled labour they need, with potentially destabilising economic effects. Others maintain that reduced levels of migration as a result of Brexit offer opportunities: they could compel educators and employers to focus on upskilling UK-based workers – particularly younger cohorts - much more than they have in the recent past.

This paper uses the Brexit moment to take stock of where Britain has got to on educational attainment, and where we might be heading. In particular it highlights that while improvements to the country's human capital stock have been driven by increasingly educated cohorts of young people flowing into the labour market, the pace of growth in young people's educational attainment has more than halved since the start of the 21st century.

This slowdown is in equal parts worrying and frustrating. Worrying – because the qualifications held by young people flowing into the labour market play the predominant role in raising the country's overall stock of human capital, a major driver of progress on productivity and living standards. Frustrating – because young people are those within closest reach of policy. For these reasons, they form a central focus of this report.

Recent decades have been characterised by a marked boost in educational attainment

The notion that adults today are more educated than those who came before them has been widely established: today's young adults were, after all, born during an era in which the soon-to-be Prime Minister declared "education, education and education" his top priorities. The scale of educational attainment change experienced by adults since the 1990s has indeed been considerable: the proportion of 22-64 year olds whose education stopped at a GCSE-or-equivalent level has fallen by one-third; the proportion who went on to attain a degree or higher has more than doubled.

This boost to the country's stock of qualifications has been driven by both an

inflow of increasingly educated younger cohorts (a plurality of whom hold a degree) and an outflow of lesser-educated older cohorts (a plurality of whom did not study beyond GCSE-equivalent levels). As such, while the modal UK worker in 1996-98 had attained at most a Level 2 (GCSE-equivalent) qualification, the modal UK worker in 2016-18 was a graduate. The scale of the change over this period is particularly high by international standards.

Attainment growth has been spread across the labour market, as well as across gender and ethnicity

Importantly, educational attainment growth has not been limited to a particular set of jobs nor to specific groups of people. Since the late 1990s, the share of 25-28 year old new job entrants qualified only up to GCSE-equivalent levels has fallen across 24 out of the 25 occupations that make up the Office for National Statistics' (ONS) two-digit occupational classification. Some of the largest falls occurred within elementary service, caring, sales and secretarial roles – jobs that both employ a large share of the overall UK workforce and that started out the time period with a high share of lower-qualified workers.

Moreover, the rise in qualification levels has not been entirely centred on Bachelor's degrees; among some roles, like health and care assistants, much of the growth has centred on mid-level qualifications. While in other jobs, such as professional researchers and engineers, growth has been exclusively within top-level qualifications – Master's degrees and PhDs.

Just as attainment growth has been spread across occupations, so too has it been spread across sex and ethnicity. While the wider 25-28 year old degree attainment rate more than doubled from 17 per cent in 1996-98 to 40 per cent in 2016-18, the share of young black women with degrees more than trebled (from 13 per cent to 49 per cent), as did the share of young Indian women with degrees (from 22 to 75 per cent). These patterns mean that the level of variation in attainment that exists between sex and ethnicity groups has fallen. In 1996-98, young Indian men were more than 3 times as likely to have a degree as young Pakistani & Bangladeshi women. Today, no group has a degree attainment rate that is treble that of any other. This pattern of progress and attainment gap narrowing is very good news.

However, large attainment gaps persist

Class-based gaps in degree attainment also appear to have waned to some extent: the degree attainment rate among 50-54 year olds who grew up in homes with a parent in a high-skilled occupation is 120 per cent higher than among their counterparts who grew up in homes with parents in mid- and

lower-skilled work. The same gap among 30-34 year olds is 60 per cent – still sizable but half that of their older counterparts. Importantly however, this pattern does not extend to Master's level and above. As degrees have become the 'new norm', individuals from advantaged backgrounds have differentiated themselves by seeking out higher levels of attainment.

The advantage of having a 'head-start' also extends to region. For instance, the degree attainment rate among 25-28 year olds in Northern Ireland during 2016-18 (35 per cent) was just below the degree attainment rate in inner London a full 20 years earlier (36 per cent). In fact, regions that experienced the largest percentage point growth in the size of their young degree-holding populations between 1996-98 and 2016-18 were those that began the period with an above-average share of young degree holders. Despite qualifications growth, those that started out behind the pack have struggled to make relative gains.

The least painful way of closing these persistent geographical and class gaps in young adults' education attainment requires continued overall attainment growth that is targeted at the groups and areas still experiencing large attainment gaps today.

The pace of educational attainment growth has more than halved since the turn of the century, and this slowdown has been widely spread

During the late 1990s and early 2000s, the qualifications held by young people flowing into the labour market rose at an astonishing rate: year-on-year between 1997 and 2003, the average increase in the share of 25-28 year-olds with a Bachelor's degree or higher grew by 1.8 percentage points; the share with GCSE grade A*-C equivalent or lower qualifications reduced by an average of 2.3 percentage points.

However, these rates more than halved from 2004: over 2004-10, the average annual increase in Bachelor's degree and higher attainment fell to 0.7 percentage points; even more significantly the reduction in those with GCSE and lower qualifications fell to just 0.3 points. These rates of change have improved slightly since 2010 but remain just over half the size of 1997-2003 levels.

This slowdown in qualifications improvements has not been driven by any particular region or group: attainment progress slowed in all but one of the UK's regions of residence, as well as among ethnic minority and white women, and white men. Men from black, Asian and ethnic minority (BAME) backgrounds have proved an exception, experiencing higher-levels of

attainment growth over 2012-18 than during 1997-2003.

This slowdown matters because educational attainment growth can deliver higher living standards – and cannot be dismissed as simply the result of migration or skills saturation

The premise of this work is that this slowdown in human capital growth is problematic because rising educational attainment is a driver of productivity improvements, which determine real pay improvements in the long run. But it is worth considering some counter-arguments that might be made about why policy makers should be relaxed about the attainment growth slowdown. We focus on two, the interaction with migration and the suggestion that slowing skills supply growth simply reflects slowing demand growth.

On migration one might note the correlation between the timing of the attainment slowdown and the rise in inward migration that occurred from 2004. One hypothesis could be that an inflow of migrants relieved some of the country's demand-driven education and training needs, leading to slower human capital growth for younger cohorts. A second, competing, hypothesis would be to suggest that migrants from the EU, were they to enter the UK with lower-levels of education than the UK-born average, could have been responsible for a downshift in the wider pace of attainment growth that is then driving the overall attainment growth slowdown.

Both hypotheses are not good explanations for what we see in the data. The first hypothesis disproves itself: had skilled migration allowed the country to take its foot off the pedal of attainment, there would not have been a slowdown. The second hypothesis also falls short: the rise in migrant numbers during and after 2004 appears to have had little effect on the slowing pace of educational attainment that occurred among the wider 25-28 year old population. Indeed the slowdown in attainment growth is visible whether or not we focus on the whole population or remove migrants from the analysis. If anything, over the most recent period (2012-18) the inflow of migrants appears to have slightly masked the extent of the qualifications slowdown.

Another argument against worrying about the slowdown in attainment growth is that it reflects Britain reaching the limits of educational improvements desired by our firms. But there is little evidence to back this up, not least when we consider Britain in international context. It is still the case today that more than a quarter of 25-28 year olds in the UK have lower-level or no qualifications (i.e. GCSE-equivalent and below) and the UK is unique for having such a large share of lower-qualified young adults: the UK has a higher share of low-qualified (below GCSE A*-C -equivalent) young adults (13 per cent) than many other English-speaking countries, including Canada (7 per

cent), the US, Ireland (8 per cent each) and Australia (11 per cent).

British firms also report ongoing demand for more skills than they are able to access. The implication is that a key driver of the educational attainment slowdown is the nature of domestic skills supply.

Employer demand helps us to understand the types of attainment boost that would yield the greatest economic returns

Employer-reported skill shortages – vacancies that go unfilled for skill-related reasons – should, of course, be interpreted with caution. However, firms' hiring difficulties do help to shed light on where an acceleration in skills supply could have the biggest impact on the economy. Our analysis finds that while higher-level academic qualifications have a role to play in filling some of the country's largest skill shortages, a range of mid- and higher-level technical and vocational qualifications are strong candidates for restarting attainment growth in a way that matches current demand. For instance, shortages are high in occupations that have long required degrees, such as mechanical or production engineers, but also in technical roles requiring mid-level qualifications, such as skilled trade roles in construction and manufacturing.

Skill shortage roles that are migrant reliant and pay below proposed salary thresholds indicate where further skills demand may emerge post-Brexit

The UK's skills landscape has come under increased scrutiny in light of proposals to move towards a stricter migration regime once the UK leaves the European Union (EU). We cannot extrapolate from current trends the effects that reduced migration would have on the shape of different sectors, nor on future demand for labour given the interaction between the impact on demand as well as supply of lower migration. However, illustrating the types of roles that suffer from skill shortages already, that are migrant reliant and where pay is unlikely to meet proposed migration salary thresholds, can help highlight areas in which there is more chance of firms facing short- to medium-term skills and staffing pressures.

Migrants are no more likely than their UK-born counterparts to work in roles that feature above-average levels of skill shortages and pay below the relevant migration salary threshold. However, migrants that do still comprise a large share of today's employment: there are 1.4 million migrants (26 per cent of the working migrant population) who are currently employed roles with above-average skill shortages and earn below the proposed salary thresholds

for their occupation. Potentially affected roles include chefs, drivers, carers and nursing assistants, construction operatives and hotel and restaurant managers.

The fact that these 1.4 million migrants work under conditions that would fail to pass proposed migration rules does not imply that they would be lost were the proposed migration policy changes to be implemented, and the possibilities of adjusting to a different migration regime should not be understated. The future migration regime would apply to inflows rather than existing workers and employers' requirements are able and likely to change over time. However, understanding the size of these pressures does help to highlight the scale of the changes being proposed and their relationship to already-existing employer-reported skills needs.

Employers are also suppliers of skills, but work-related training has long been directed away from lower-qualified staff, including those whom employers think lack necessary skills

Employers are right to be concerned about challenges in recruiting appropriately-skilled workers, and may also be concerned about how these pre-existing challenges develop under a new migration regime. However, employers are also suppliers of skills, and they have particular agency to build and develop the capacities of their own staff. Yet, work-related training has long skewed towards the already-highly-qualified and away from the workers whom employers are most likely to say lack the skills required for their job.

For instance during 2016-18, 22-64 year olds with Master's degrees were almost three times as likely to report having recently received work-related training as their counterparts with qualifications below GCSE A*-C-equivalent levels. In addition, 29 per cent of staff in roles that, according to employers, have a below-average share of workers that lack the skills necessary for the job report having recently received training; just 16 per cent of staff in roles with an above-average share of such 'skill gaps' reported the same.

Crucially, this skill gap-related difference in training rates persists even among workers with similar qualifications: the training rate for Master's-level educated staff in below-average skill gap roles is higher (36 per cent) than for Master's-educated staff in above-average skill gap roles (24 per cent). Among those with below GCSE-equivalent education these figures are 14 per cent and 8 per cent, respectively. Employers appear to be compounding their own skills challenges.

If the changing migration landscape and its effects on skill shortages

underscores, on the one hand, the importance of accelerating the speed of human capital growth in a way that matches current business demands; then the persistent pattern of lower-training rates for lower-qualified workers should, on the other, justify a concurrent focus on what businesses can do to improve the skills of their existing staff.

Employers, educators and policymakers should restore the pace of human capital growth, focusing on the people, places and parts of the economy with the most to gain

Picking up the pace of attainment progress is an imperative for productivity and living standards – no matter whether you believe Brexit offers a challenge, or an opportunity, to the UK's skills supply. On the inflow of younger cohorts into the labour market we require a concerted effort to lift the (comparatively) large share of young people off the educational attainment 'floor', just as we need to ensure that attainment growth spreads to those groups and regions that are currently left behind.

To that end, policy agendas that aim to boost the proportion of young people attaining Level 3 (A level equivalent) qualifications or higher, as well as plans to improve the offer at this level, are welcome. In addition and in reflection of our discussion of employer demand, information on vacancies and wages should be made available to prospective learners at all levels.

Employers also have a role to play in picking up the pace of attainment and improving skill levels among the current stock of workers: efforts that encourage employers to invest in skills of their current and future workforce are key. Policies that aim to achieve this, like the apprenticeship levy, are welcome developments where continued focus and drive will be crucial to achieving the long term culture change we need to see. That is, however, subject to their delivering high-quality training and pushing against the traditional inequities that have defined so much work-related training, which has long been disproportionately directed towards the already highly qualified rather than to the lower-qualified workers whose skill levels firms often bemoan. The centrality of human capital improvements to productivity growth and higher living standards will only increase as Brexit sets in – the time to pick up the pace is now.

Section 1

Introduction

Rising levels of educational attainment are a key driver of living standards

Over recent decades, each and every birth cohort has received more education than the one immediately preceding it. On the surface, this appears unsurprising: from policy agendas focused on "education, education, education" to continual debates about whether too many young people head off to university, the notion that UK education levels rise over time is well established. Nonetheless, the actual scale of that rise remains striking: in 1996, the typical 35 year old in work in the UK was educated only up to a GCSE A*-C-equivalent level; in 2018, the typical in-work 35 year old had a degree.

For many, the opportunity to attain a higher level of education than what was once the norm has proven transformative: receiving higher qualifications than your parents is usually a necessary (though not always sufficient) step for attaining both a higher-skilled job and higher levels of pay.[1] This is the case because higher levels of educational attainment are a central driver of productivity improvements, which are the key long-term drivers of earnings growth. The causal relationship between growth in the stock of skills and growth in productivity has been well documented both within the UK and across countries.[2]

The question of the role that rising educational attainment plays in delivering productivity growth remains as important as ever in the context of work in Britain. It also remains important in the context of a world being reshaped by technology and automation, the other big driver of productivity improvements. Much recent commentary has focused on the potential for the current wave of automation – dubbed the 'fourth industrial revolution' – to threaten aggregate employment prospects.[3]

Whether or not these predictions prove overblown, technological change makes the education and skills of workers more important, not less. Economists have argued that while technological change, including automation and mechanisation, can serve to

[1] See: J Blanden et. al, 'Changes in intergenerational mobility in Britain' in *Generational and income mobility in North America and Europe*, edited by M Corak, Cambridge University Press, 2004
[2] See: R Barro, 'Human capital and growth', *American Economic Review*, 91(2), May 2001; B Sianesi & J Van Reenen, 'The returns to education: macroeconomics', *Journal of Economic Surveys*, 17(2), April 2003; E Hanushek & L Woessmann, 'Do better skills lead to more growth? Cognitive skills, economic outcomes, and causation' *Journal of Economic Growth*, 17(4), December 2012
[3] M Carney, '*The spectre of monetarism*', Bank of England, December 2016

replace lower-skilled routine and manual labour on the one hand, it can also serve to complement labour and boost productivity among higher-skilled workers on the other.[4]

In sum, in this century just as in the last, we should be focused on educational attainment growth in Britain because it is one of the central ways in which living standards are improved.

Depending on where you stand in the Brexit debate, leaving the EU presents us with either a skills challenge or a skills opportunity

Now – in the midst of the UK's departure from the European Union – is a particularly important time to be thinking about skills improvements in Britain. People on either side of the Brexit debate have linked Britain's EU departure to the country's skills system and future skills requirements. For some, Brexit represents a skills challenge, with a reduction in ready access to workers coming from the EU entailing a lack of suitably skilled staff for businesses, particularly in certain sectors of the economy, with potentially destabilising effects.[5] For others, Brexit represents an opportunity to get back to the idea that the first option for Britain is to train its own people.[6]

Whichever view is taken, it's clear that Brexit gives new impetus to longstanding skills policy debates. As such, now is a good time to review where Britain stands in terms of levels of educational attainment, and what lessons we can draw in terms of responding to the challenges and opportunities that Brexit provides. That is the core purpose of this report. In particular, because it is where the scope for policy to deliver change tends to be greatest and where the Brexit-related skills debate has tended to focus, we shine a light on the skills and qualifications of young adults entering the workforce.

The structure of this report

The report is structured over four further sections, as follows:

- **Section 2** sets out **the scale of educational attainment growth** that has occurred across the UK between 1996 and 2018. It highlights how the flows of increasingly educated young people into the labour market have changed the composition of qualifications within different occupations, regions, ethnicities and social class groups. It also sets out where, despite substantial attainment growth, large educational inequalities persist – particularly across regions and in terms of social class.

[4] See: Autor et. al, 'Computing inequality: have computers changed the labor market?', *Quarterly Journal of Economics*, 113(4), November 1998; C Goldin & L Katz, 'The race between education and technology', *Harvard University Press*, 2010; M Goos et. al, 'Explaining Job Polarization: routine-biased technological change and offshoring,' *American Economic Review*, 104(8), August 2014

[5] The Financial Times Editorial Board, 'The UK's skills squeeze poses another Brexit dilemma', *The Financial Times*, 12 November 2018

[6] E Malnick, 'Post-Brexit Britain needs a 'skills revolution', says Peter Lilley', *The Telegraph*, 23 June 2018

- **Section 3** details **the slowdown in the pace of educational attainment growth** for new entrants to the world of work since the early 2000s. It notes that the pace of attainment growth has halved across most qualification levels, and that this halving has been relatively broad-based, spanning regions, sexes and ethnicities. We find no evidence that this slowdown can be dismissed as a cause for concern on the basis of being driven by a rise in migrant numbers or because Britain has simply reached the saturation point of educational improvements. The implication is therefore that it is in a large part driven by the dynamics of skills supply.

- On this basis, **Section 4** explores where in the economy an acceleration in the supply of skills might have the most impact by considering **employer demand**. It sets out those job roles for which employers report being unable to hire suitably skilled staff today, and those for which pressure points may emerge in future in the context of the proposed post-Brexit immigration regime. In addition, we consider the role of employers in delivering skills improvements in terms of training people once they have entered the world of work, noting the concerning relationship between low and declining training rates and the roles in which employers report that their existing staff lack required skills.

- **Section 5** provides a brief **conclusion**.

Section 2

Attainment growth

Taking stock of Britain's qualifications profile on the eve of Brexit, it's clear just how much has changed in recent decades. There has been a dramatic uplift in UK qualification levels since the 1990s, where this analysis begins. The share of the 22-64 year old population with no formal qualifications has more than halved since 1996; the share with Bachelor's degrees and higher has more than doubled. This boost to the country's stock of qualifications has been driven by both an inflow of increasingly educated younger cohorts (a plurality of whom hold a degree) and an outflow of lesser-educated older cohorts (a plurality of whom did not study beyond GCSE-equivalent levels).

Focusing on young adults entering the workforce, the effects of rising attainment have spread across the population, particularly in terms of sex and ethnicity groups, between which qualification gaps have narrowed. This is a very positive story. But in other respects, such as in relation to region and socioeconomic background, large qualifications inequalities continue unabated. Attainment growth has not always been distributed evenly, nor has it consistently helped those regions or socioeconomic groups that started out with lower levels of education to 'catch-up'. This implies that to make progress on closing these gaps, educational attainment growth needs to continue and to be focused on the groups and areas currently trailing the pack on educational attainment.

The UK is a much more educated country than it was just two decades ago

The UK labour force is much better educated today than it was just 20 years ago. Since the late 1990s, the proportion of workers who stopped their education at a GCSE-or-equivalent level has fallen by one-third; the proportion who went on to attain a degree or higher has more than doubled.

More specifically, during 1996-98, over 45 per cent of the 22-64[7] year old UK population[8] had only reached a lower level of attainment (GCSE A*-C-equivalent or

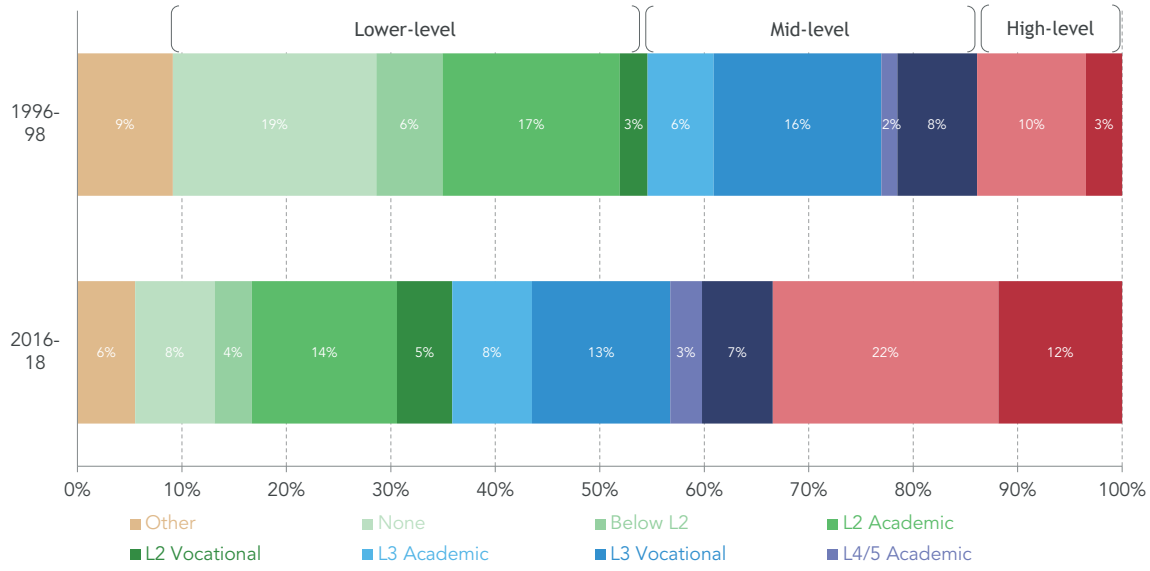
[7] Unless otherwise noted, this report classes the 22-64 year old age group as the default working age. 22, rather than 16 or 18, is used to mark the first year of working age because that is the age when the large majority of university-educated adults leave full-time study and enter into the labour force. Capturing educational outcomes an earlier age could serve to artificially depress the reported proportion of graduates within a particular cohort or age group.
[8] Unless otherwise noted, figures in this report refer to the UK-wide population. Noted exceptions include data on funding for adult education in Section 3.

below, excluding those qualifications classed as 'other'). Roughly one-third had achieved a mid-level qualification, such as an A level-equivalent or sub-degree higher education course, and just 14 per cent of people had attained a higher-level qualification: one-in-ten had a Bachelor's degree and one-in-forty a Master's degree or PhD.

Figure 1 illustrates just how different things look today: the proportion of 22-64 year olds with lower levels of attainment fell from 45 per cent in 1996-98 to 30 per cent in 2016-18. The proportion with mid-level qualifications held roughly flat at 30 per cent, while the proportion with higher-level qualifications more than doubled, from 14 to 33 per cent, over the same time period. Looking within the higher-qualification category, we find that the share educated to degree level more than doubled, from 10 to 21 per cent, while the share with a Master's degree or higher more than trebled, from roughly 4 to 12 per cent.

Figure 1: In 20 years, the share of the 22-64 year old population with a degree has more than doubled

Highest qualification held by 22-64 year olds



Notes: A three-year average for each of the time periods (1996-98 and 2016-18) has been used.
Source: RF analysis of ONS, *Labour Force Survey*

To describe these trends in a different way, the modal UK worker in 1996-98 had attained at most a Level 2 (GCSE-equivalent) qualification; the modal UK worker in 2016-18 was a graduate. This rate of change is particularly high by international standards: recent Resolution Foundation research found that the increase in the share of people with tertiary-level qualifications between the 1960s and 1970s birth cohorts (i.e. based on attainment growth that happened between the 1980s and 1990s in the main) was larger in the UK than anywhere else.[9]

[9] F Rahman & D Tomlinson, *Cross countries: international comparisons of intergenerational trends*, Resolution Foundation, January 2018

Taking stock of Britain's educational attainment profile on the eve of Brexit, both today's levels of attainment and how far the country has come over the past two decades are impressive.

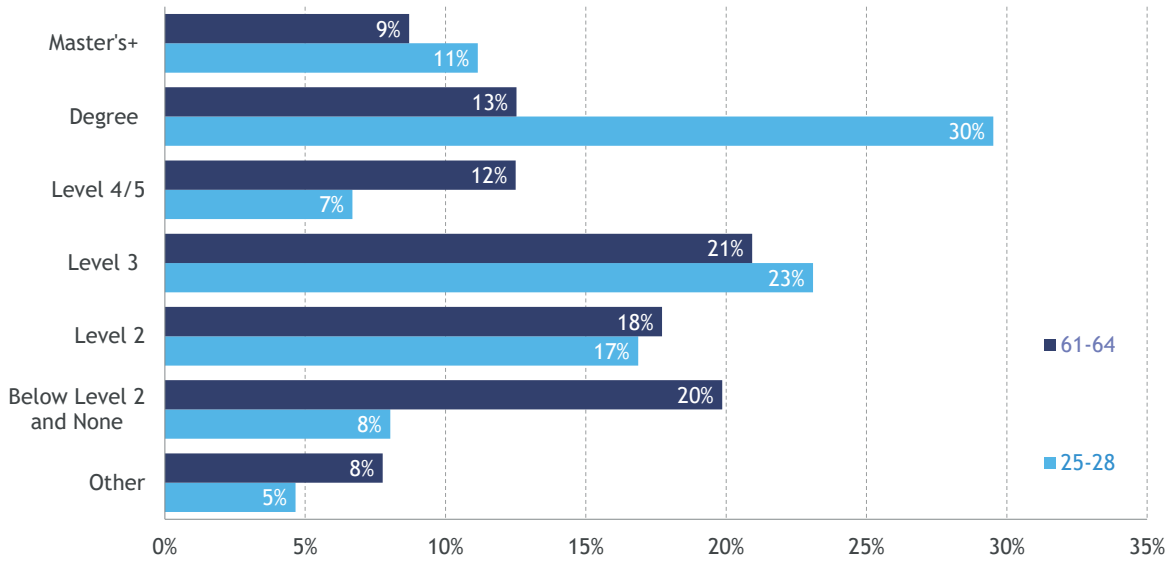
Changes in the UK's stock of qualifications have been driven by differences between the flows of workers moving into, and out of, the labour force

Rapid changes in the stock of qualifications have been driven by the very different educational profiles that exist between younger people, who are just entering the labour force, and older people, who are close to retiring from it. On the one hand, this is unsurprising: we would expect most of the change in stock to stem from the different composition of young people flowing in and older people flowing out. On the other hand, we can gauge the extent of longer-term educational progress by examining just how large some of these age-related differences in qualifications are.

These different profiles are shown in Figure 2, which examines the highest qualification held by those aged 25-28 compared to the highest qualification of those aged 61-64. While one-in-five people in their early sixties have not been educated up to GCSE-equivalent levels (excluding qualifications classed 'other'), fewer than one-in-ten people in their mid-20s have a highest qualification that sits below GCSE-equivalent levels.

Figure 2: Younger people flowing into the labour market have a very different qualifications profile from those at or near to retirement

Highest qualification held by 25-28 and 61-64 year olds: 2016-18



Notes: A three-year average has been used.
Source: RF analysis of ONS, *Labour Force Survey*

At the other end of the scale, we find a sharp difference in the proportion of the two age groups whose highest qualification is a Bachelor's degree. 12 per cent of those in their early 60s have attained a degree (and no higher), which is well under half the share of young people qualified to that level (30 per cent). The 2 percentage point difference in the share of older people who have attained a Master's degree or higher (9 per cent) versus the share of younger people that have done so (11 per cent) may at first glance be surprising, given the large-scale, age-related differences found at degree level. This small difference could be driven by a tendency for individuals to complete a Master's degree after they have embarked on a career.

As with Figure 1, Figure 2 shows that age-related differences in attainment appear largest at the lower and upper ends of the qualifications distribution, with fewer differences in the middle. The share of younger people who stopped their education at Level 2 (GCSE-equivalent) is only 1 percentage point lower than the share of older people who did so; the share who stopped their education at Level 3 (A level equivalent) is only 2 points higher.[10] The difference in level 3 is, in part, due to the stronger link that exists today between completing a Level 3 course – typically an A level but also a BTEC – and progressing immediately onto a degree course at age 18. In other words, a greater proportion of young people with a Level 3 qualification progress to university than enter work than was the case in the past.

This comparison of the skills profiles of people entering and exiting the labour market drives our focus throughout most of the remainder of this report. While policy can affect labour market outflow rates and can target higher attainment for those already well established in the workforce, higher attainment among successive cohorts of inflows is what tends to drive change. This is where policies related to educational attainment tend to focus, and where the debate about how Britain gets the skills improvements it needs post-Brexit has been situated. As such, in the main the remainder of this report focuses on the skills and qualifications of young adults who have recently entered the world of work.

The decades-long boost in educational attainment has had widespread effects across the labour market

The effects of educational attainment improvements for new labour market entrants have been felt across the economy. This is demonstrated in Figure 3, which shows that between 1996-98 and 2016-18, the share of 25-28 year old new starters with lower-level qualifications fell in 24 out of 25 of the two-digit occupations included in the Office for National Statistics' (ONS's) Standard Occupational Classification (SOC) system. Skilled trades in construction (e.g. carpenters and plumbers) were the sole exception.[11] Perhaps

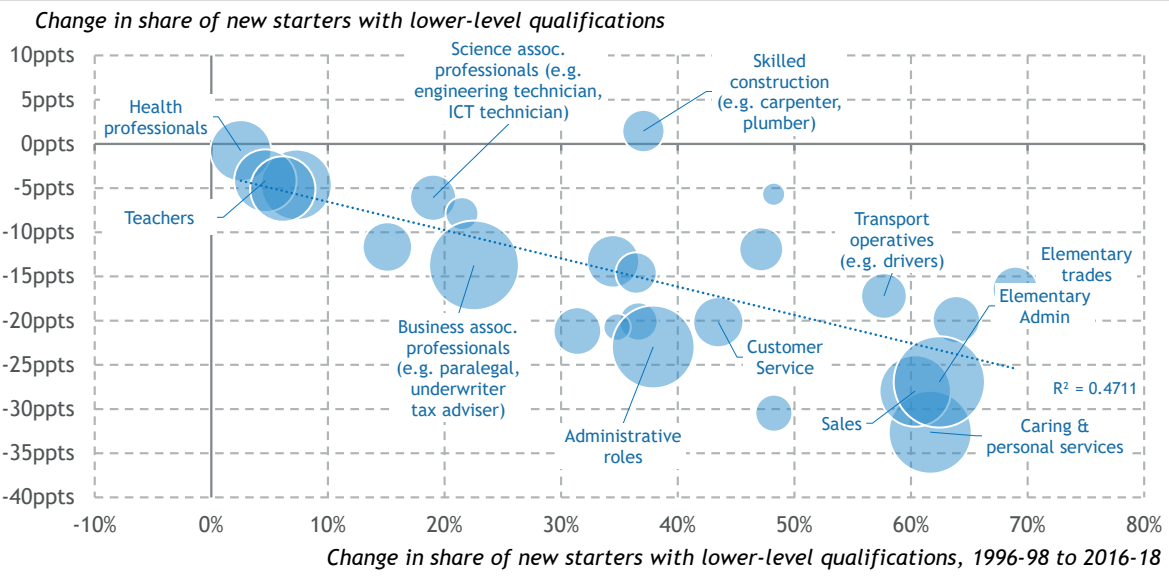
[10] There are more noticeable differences at Levels 4 and 5 – qualifications that are typically classed as higher education but sub-degree level, such as Higher National Certificates (HNCs) and Higher National Diplomas (HNDs). While 13 per cent of people in their 60s list a Level 4 or 5 qualification as their highest attainment level, only 7 per cent of those in their 20s do. This (negative) difference could be driven by an overall fall in the provision of higher-level technical courses and, relatedly, a broader fall in part-time, higher-level study. For further detail on the fall of part-time study, and funding sources for it, see: K Henehan & A Vignoles, *Technical fault: options for promoting human capital growth*, Resolution Foundation, April 2018

[11] There was a 1.4 percentage point rise in the share of 25-28 year old new starters in skilled construction trades roles that had qualifications at or below Level 2 (i.e. at or below (GCSE A*-C-equivalent levels). There is, however, a positive story beneath the lid: the share of workers with below Level 2 qualifications fell by 3 percentage points, while the share with no formal qualifications fell by 8. There was a 13 percentage point rise in the share qualified to Level. There was also a 9 percentage point rise in the share with qualifications classed as 'other.'

unsurprisingly, the negative slope running through Figure 3 indicates that falls were largest (in percentage point terms) in those occupations that had a larger-than-average share of lower-qualified young entrants at the beginning of our comparison period (1996-98).

Figure 3: Across most occupations, the share of young labour market entrants with lower-level qualifications has fallen

Share and percentage point change in share of workers with lower-level qualifications, by occupation, 25-28 year old new starters



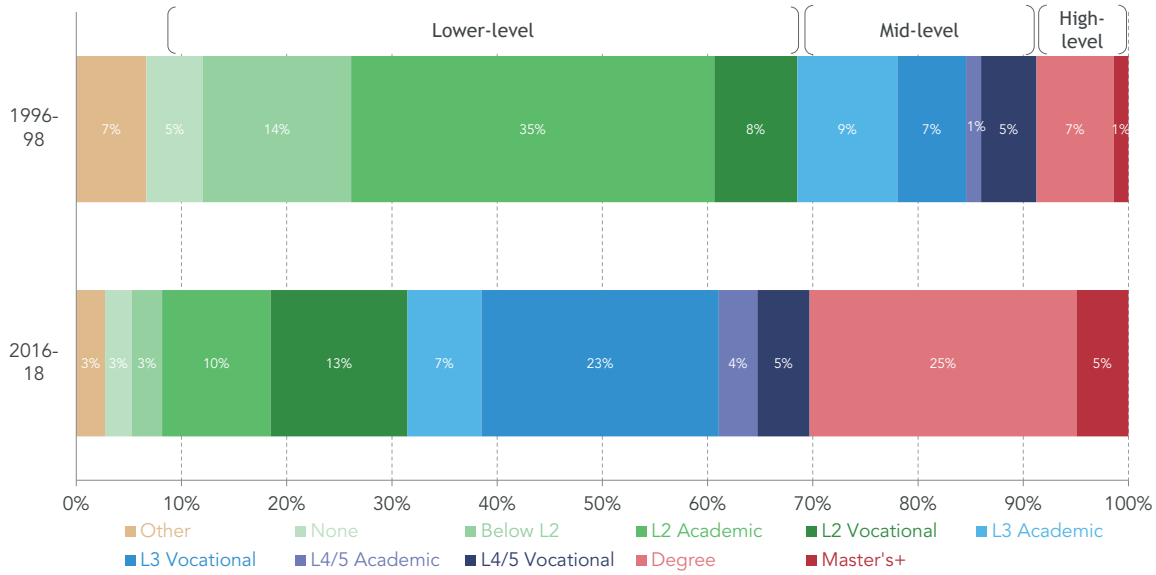
Notes: Lower-level qualifications are those at GCSE-equivalent level and below, excluding 'other' qualifications. 'New starter' indicates employees in post for less than two years. Bubble size indicates employment share in 2016-18.
Source: RF analysis of ONS, *Labour Force Survey*

Although much of the discussion surrounding qualifications growth (understandably) focuses on the large uptick in degrees over time, rising levels of attainment have changed the qualifications composition of different occupations in different ways. For instance, Figure 4 shows that the share of young, recent entrants to care work who have not progressed their education beyond a Level 2 vocational qualification has fallen markedly over recent years, from 35 per cent in 1996-98 to 10 per cent in 2016-18. While this change was complemented by a growing share of younger new care workers with degrees or higher, there was also a substantial rise in the share of younger new care workers armed with Level 3 vocational qualifications – which one might typically associate with personal service roles in health and social care.[12]

[12] Detailed qualification variables do not allow us to compare subjects within qualification levels.

Figure 4: For care workers, rising attainment levels have meant an uptick in mid-level, vocational qualifications

Highest qualification held by 25-28 year old new starters in caring and personal service roles

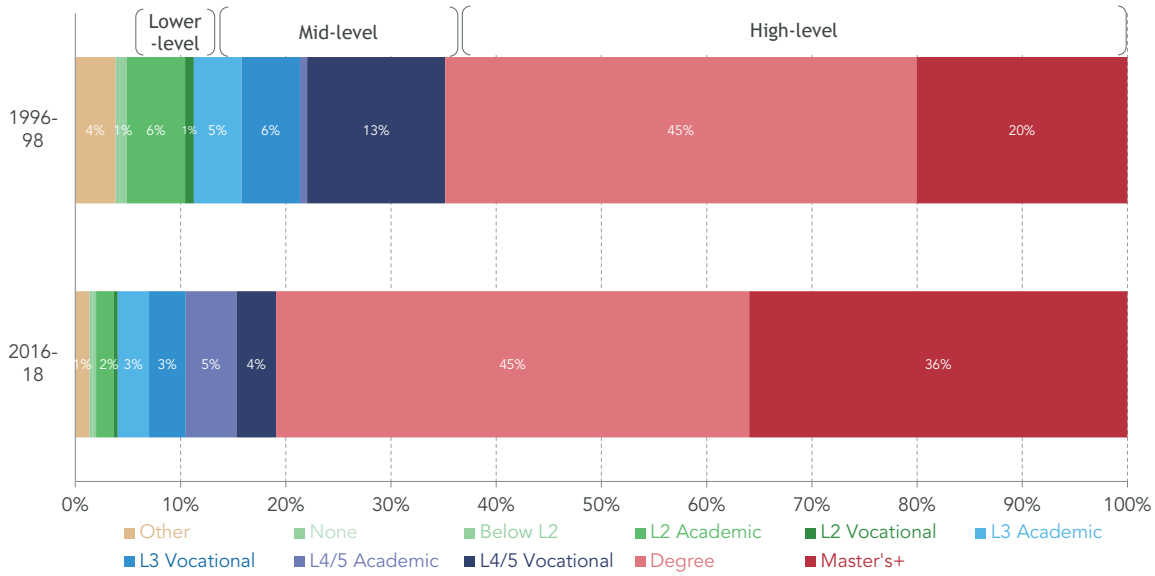


Notes: 'New starter' indicates employees in post for fewer than two years; 'caring and personal service roles' refers to the SOC two-digit occupation code 61.
Source: RF analysis of ONS, *Labour Force Survey*

At the other end of the scale, there are occupations in which the share of young new starters with degrees has held roughly flat, while the shifting share with even higher-level qualifications comprised nearly all of that occupation's qualifications change. Figure 5 charts the highest qualification held by 25-28 year olds who had recently started a science, research or engineering role in 1996-98 and in 2016-18. While the share of these new starters without a degree has fallen from one-in-three to below one-in-five, the share qualified to degree level has held flat at 45 per cent.

Figure 5: Among science professionals, rising attainment levels have primarily resulted in more people with Master's degrees

Highest qualification held by 25-28 year old new starters in science, research and engineering professional roles



Notes: 'New starter' indicates employees in post for fewer than two years; 'science, research and engineering professionals' refers to the SOC two-digit occupation code 21.
Source: RF analysis of ONS, *Labour Force Survey*

Rather, attainment growth has been entirely manifested in qualifications at or above Master's degree level: while one-in-five (20 per cent) young new starters had (at least) a Master's degree in 1996-98, more than one-in-three (35 per cent) were qualified to that level by 2016-18.

These occupational snapshots underscore the key message of Figure 3, that large aggregate improvements in educational attainment across successive cohorts of younger labour market entrants have been felt across the economy. All occupations have experienced higher-educated inflows over the past two decades, and the nature of that change is much more diverse than just a blanket increase in graduates.

Two decades of rising educational attainment have narrowed – and often reversed – qualifications gaps by ethnicity and sex

While the stock of qualifications held by today's young people is much higher than it was just 20 years ago, the composition of people who hold these qualifications has also shifted. In previous decades, white men had above-average levels of degree attainment, while white women and women from many ethnic minority groups displayed levels at or below that average. Today the reverse is true.

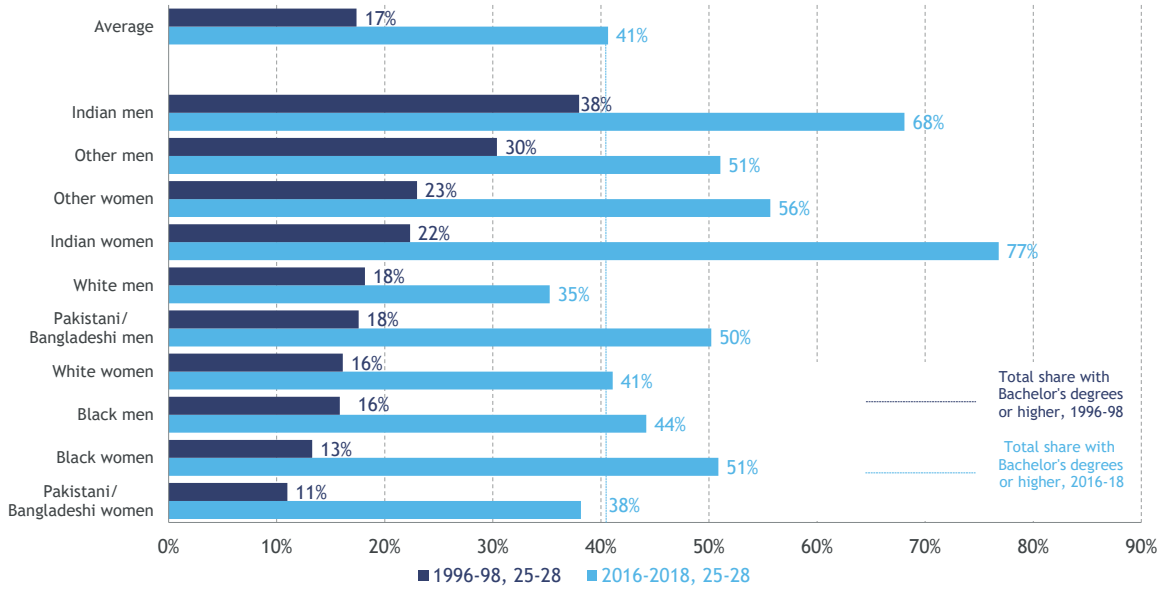
During the late 1990s, ethnic minority men and women were proportionally represented among higher-qualification holders: together, men and women from ethnic minority backgrounds formed 8 per cent of the 25-28 year old population and 9 per cent of 25-28

year old population who held degrees. By 2016-18, they formed a disproportionately large share of the highly qualified: 14 per cent of the total 25-28 year-population and 19 per cent of those 25-28 year olds with a degree.

This shift has been driven by the fact that degree attainment growth has varied markedly according to characteristics like ethnicity and sex, shown in Figure 6. For instance, while the wider 25-28 year old degree attainment rate more than doubled from 17 per cent in 1996-98 to 40 per cent in 2016-18 (a 132 per cent rise), the share of Indian women with degrees more than tripled: from 22 to 75 per cent – putting them well above the 2016-18 average. White women moved from having a below-average attainment rate in 1996-98 (16 per cent) to a just above-average one in 2016-18 (41 per cent). By contrast, white men moved from having a (slightly) above-average degree attainment rate in 1996-98 (18 per cent) to a below-average rate in 2016-18 (35 per cent).

Figure 6: White men used to have an above-average level of degree attainment; today, the reverse is true

Share of 25-28 year olds with a degree or higher, by ethnicity and sex



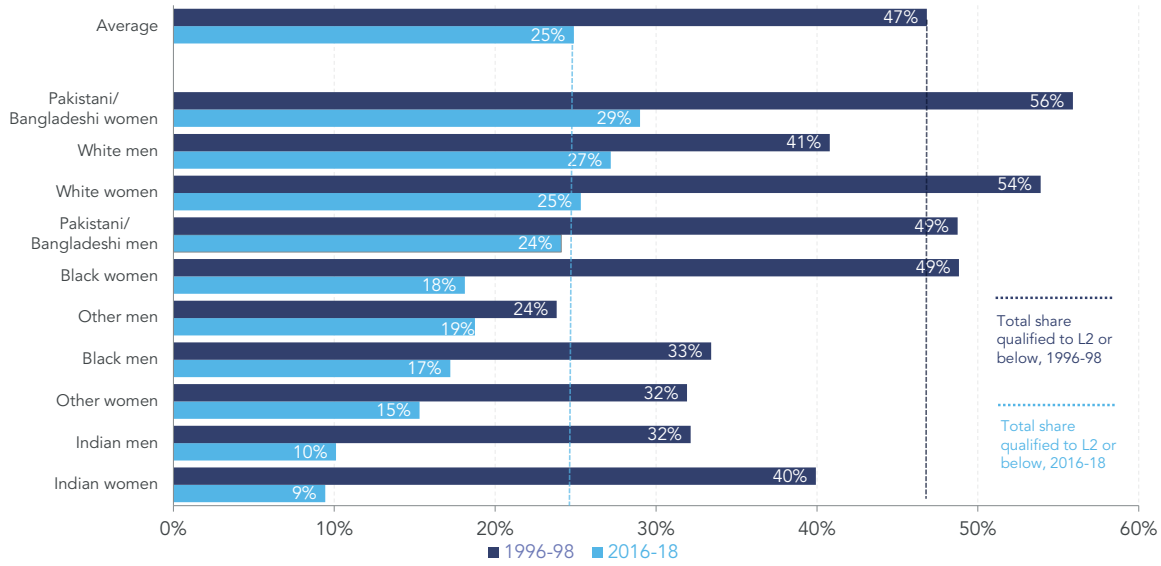
Source: RF analysis of ONS, *Labour Force Survey*

Due to the fact that the past two decades of qualifications change have boosted attainment among previously lower-attaining groups, the level of variation in attainment that exists between groups has fallen. In 1996-98, Indian men were more than 3 times as likely to have a degree as Pakistani/Bangladeshi women. Today, no group has a degree attainment rate that is treble that of any other.

White women and ethnic minorities also outperformed white men in terms of reductions in lower-level (GCSE-equivalent and below) attainment. Figure 7 illustrates that the share of Pakistani/Bangladeshi men and white and black and other ethnicity women with lower-level qualifications sat above the national average (47 per cent) during 1996-98. By 2016-18, the share of these groups with lower-level attainment sat below the wider 25-28 year old figure (25 per cent). By contrast, in 1996-98 the share of white men with lower-level attainment was, at 41 per cent, well below the national average; by 2016-18 this share had moved to just above the national average (27 per cent).

Figure 7: Across most groups, the share of 25-28 year olds with lower-level qualifications has fallen

Share of 25-28 year olds with lower-level qualifications, by ethnicity and sex



Notes: Lower-level qualifications are those at GCSE-equivalent level and below, excluding 'other' qualifications.
Source: RF analysis of ONS, *Labour Force Survey*

Overall and across the qualifications scale, the product of rising educational attainment over the past two decades has been particularly strong growth for some previously low-performing groups; and an overall narrowing of educational attainment differences by sex and ethnicity. This is clearly a good news story.

While some class-based degree attainment gaps have narrowed slightly, large gaps persist

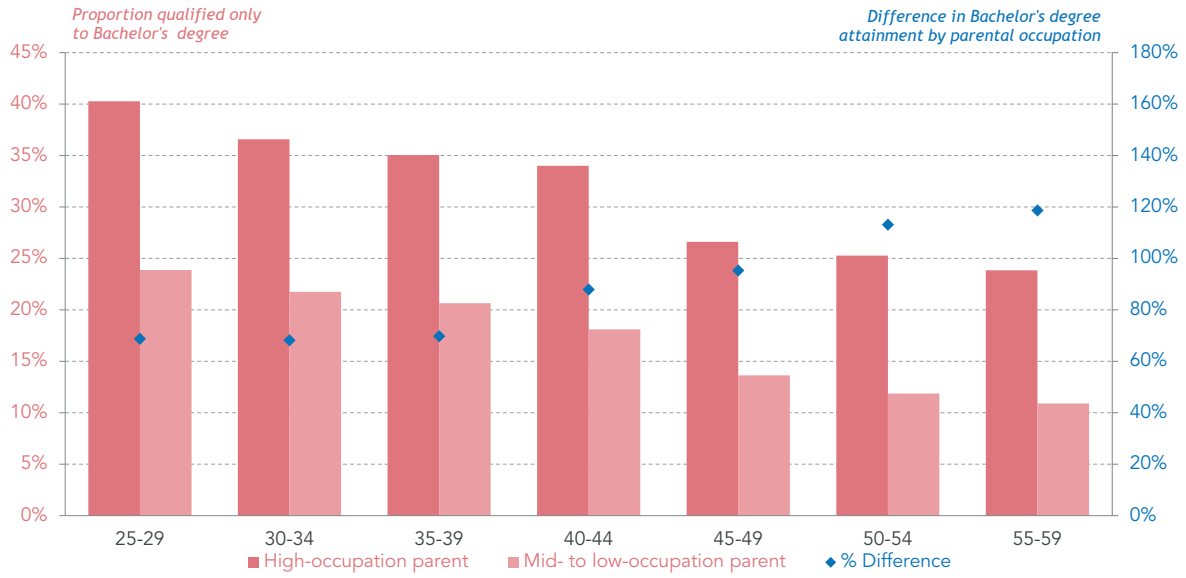
In addition to factors like sex and ethnicity, educational attainment has cut across socioeconomic background. To some extent trends in this area provide further good news, with some narrowing of gaps in degree-level attainment.

This is shown in Figure 8, which compares differences in degree attainment between individuals who come from homes in which their main wage-earning parent worked in a highly skilled occupation (e.g. managerial, professional, or associate professional roles) and those from homes in which their parents worked in mid- or lower-skilled occupations (e.g. administrative, caring/leisure, skilled trades, operative or elementary service roles).

It indicates that 37 per cent of today's 30-34 year olds with a parent who worked in a highly skilled occupation have gone on to a attain a degree, as compared to 22 per cent of those whose parents worked in a mid- or lower-skilled role. Though the class-based difference among younger people is notable, differences are larger for older age groups: among 50-54 year olds the proportion of people from higher socioeconomic backgrounds who went on to attain a degree (25 per cent) is more than twice as large as the proportion from mid- to lower-skilled households who did so (12 per cent).

Figure 8: The class-based degree attainment gap is narrower for younger age groups

Share of age group with Bachelor's degrees or higher, by parental occupation at age 14: 2014-18



Notes: Figures for the entire 2014-18 period have been averaged together in order to build a larger sample size. 'High-occupation' refers occupations that sit with the ONS SOC major categories one through three; 'mid-low-occupation' refer to occupations sitting within SOC major categories four through nine.
Source: RF analysis of ONS, *Labour Force Survey*

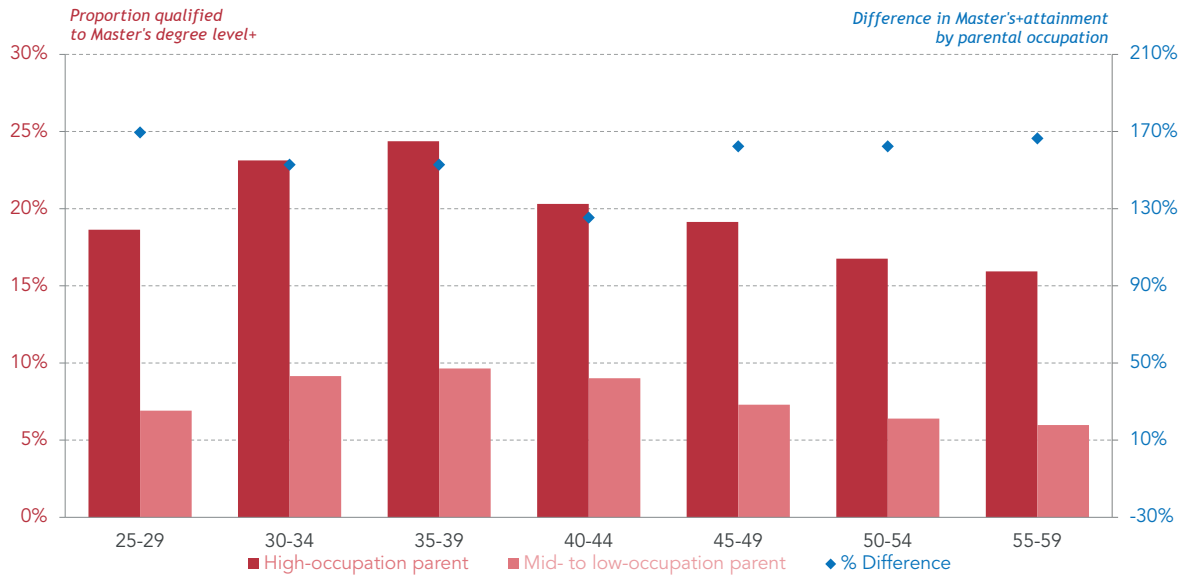
Although large class-based differences in degree attainment persist within younger age groups, the fact that the size of these differences is lower for younger groups than for older ones suggests that the class-based gap in degree attainment has weakened somewhat over time.[13]

[13] Parental occupation is derived from a question added to the ONS *Labour Force Survey* in 2014, which limits the ability for time-series comparison. As such, on the basis that most people gain their formal qualifications before the age of 25, age-related differences in degree attainment are employed as a proxy for change over time.

However, a closer look at what's happening within each cohort of graduates suggests that young people from higher socioeconomic backgrounds have been successful in maintaining their advantage further up the qualifications scale. As Bachelor's degrees become the labour force's modal qualification, we might expect advantaged groups to seek out the next rung of attainment (i.e. Master's degrees and higher), in order to maintain an edge in jobs market. Indeed, while Figure 8 illustrated that the class-based gap in Bachelor's degree attainment is narrower for younger age groups (suggesting that policy over recent decades has helped to equalise access to degrees), Figure 9 provides no such evidence in relation to Master's degrees. No clear pattern emerges here: the class-based difference in Master's degree attainment is not substantially smaller for those aged 30-34 than it is for those aged 50-54.

Figure 9: There is little evidence that the association between socioeconomic background and Master's degree attainment has weakened for younger age groups

Share of age group with Master's degrees or higher, by parental occupation at age 14: 2014-18



Notes: Figures for the entire 2014-18 period have been averaged together in order to build a larger sample size. 'High-occupation' refers occupations that sit with the ONS SOC major categories one through three; 'mid-low-occupation' refer to occupations sitting within SOC major categories four through nine.
Source: RF analysis of ONS, *Labour Force Survey*

This type of 'one-up' pattern is often referred to as 'effectively maintained inequality', where the equalisation of access and achievement in one area of attainment spurs individuals from advantaged backgrounds to differentiate themselves by seeking out ever higher levels, or more prestigious forms, of attainment.[14] In contrast to strongly equalising trends by ethnicity and sex, the clear conclusion is that very large educational advantages for those from higher socioeconomic backgrounds persist, and show few signs

[14] See: J Blanden & L MacMillan, 'Educational inequality, educational expansion and intergenerational mobility', *Journal of Social Policy*, 45(4), 2016

of abating. Rather that the good news story we told above, this is a less welcome feature of the past two decades of strong educational attainment growth.[15]

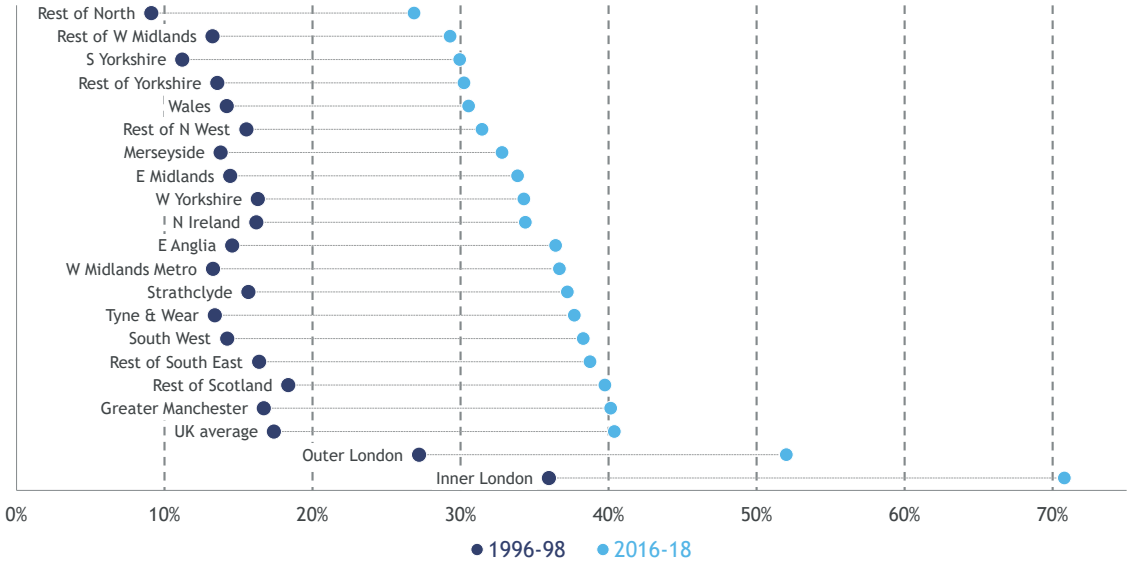
Regional gaps in educational attainment also appear entrenched

The advantage of having a 'head-start' is, of course, not limited to factors like class. A second area in which the past two decades of growth have not served to narrow gaps is in terms of geography. Attainment growth has occurred across the country but it has been strongest in those regions that started out with a more qualified workforce.

In each of the ONS's usual regions of residence outside of London, the proportion of 25-28 year olds holding a degree has at least doubled over the last 22 years. It's worth stepping back to appreciate the magnitude of this change: Figure 10 shows that in Greater Manchester, for instance, the share of the young population theoretically able to work in graduate-level roles has more than doubled from 14 per cent in the late 1990s to just more than one-in-three (34 per cent) today. Unsurprisingly however, regions started our comparison period (1996-98 to 2016-18) from quite different points. At one end of the spectrum, 13 per cent of 25-28 year olds in Tyne & Wear were educated to degree level and at the other end, 36 per cent in inner London were.

Figure 10: Across all regions, the share of young adults holding a degree has more than doubled, although London has surged ahead

Share of 25-28 year olds with a degree or higher



Source: RF analysis of ONS, *Labour Force Survey*

Although the share of the population with degrees grew by at least 16 percentage points in each area, there was very little equalisation between the rest of the country and London

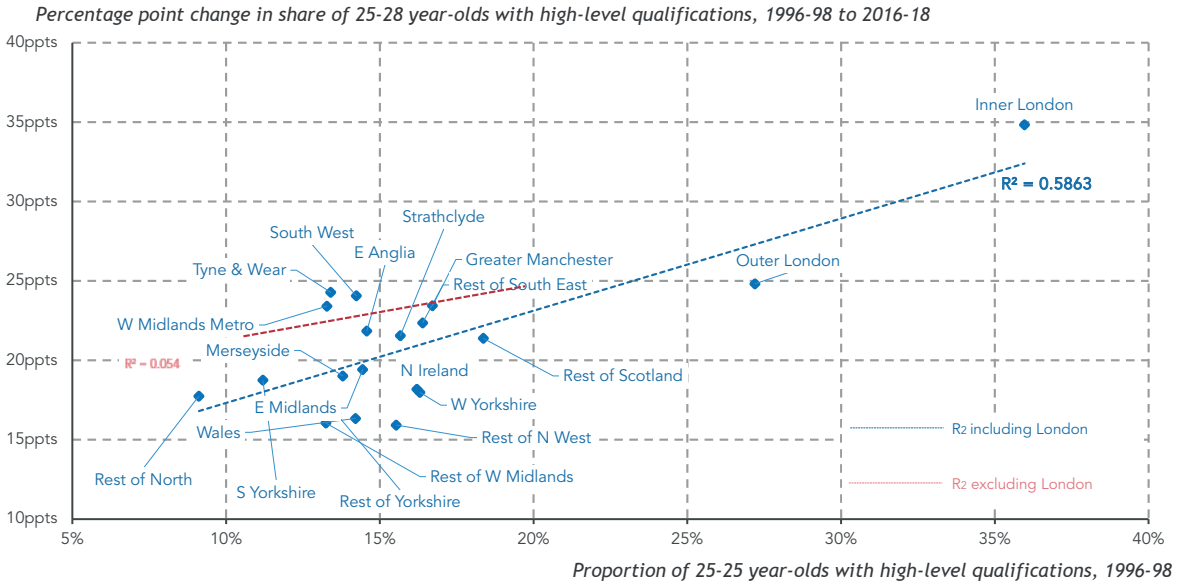
[15] In a bid to boost access to postgraduate study, the government introduced postgraduate tuition fee loans in 2016. The loans are available to individuals under the age of 60, who have EU or UK nationality and reside in England (or have resided in England for three years). Master's degree loans are available up to a limit of £10,609 (for the entirety of the course) and PhD loans are available up to £25,000 for the whole of the course.

and the South East. The progress we highlighted for Greater Manchester (from 14 to 34 per cent) appears less pronounced when compared against inner London, where the share of 25-28 year olds with degrees grew from 36 to 71 per cent. In fact, some regions ended our comparison period with a lower share of degree-holders than London started it: for instance, 29 per cent of 25-28 year olds in the West Midlands outside of Birmingham had a degree in 2016-18, slightly lower than the 36 per cent of inner Londoners with a degree in the late 1990s.

Digging deeper, Figure 11 indicates something of a 'Matthew effect' in attainment growth: regions that experienced the largest percentage point growth in their degree-holding 25-28 year old populations between the late 1990s and today are the same regions that began the period with an above-average share of degree holders. Much of this association is driven by inner and outer London, which began the comparison period with well above-average shares of graduates, and experienced growth of 35 and 25 percentage points, respectively. However, the positive slope – which shows the association between having a large share of graduates and a large share of growth in graduates – persists once inner and outer London are removed from the analysis, albeit a weaker correlation.

Figure 11: The proportion of the 25-28 year olds with high-level qualifications grew most in regions that were already highly qualified

Share and percentage point change in share of young adults with a degree or higher, by region



Source: RF analysis of ONS, *Labour Force Survey*

It is likely that a number of factors drive the association found here. First, Figure 11 shows the share of 25-28 year olds adults *currently living in a region* that have a degree, and not the share of 25-28 year olds adults *who were born, or grew up, in that region* and went on to attain a degree. As a result, the figures are likely to reflect internal migration and agglomeration effects: areas like London and the South East started the period with a larger-than-average number of professional firms and highly skilled jobs, which attract a larger-than-average share of the country's graduates, which in turn facilitate more growth in professional firms and highly skilled roles, etc.

However, we shouldn't overstate the potential size of these effects, with recent research finding that nearly half of individuals in the UK only ever live and work in the place in which they were born.[16] Regional immobility means that an area's workers are likely largely a product of its own education institutions.

Indeed, other research suggests that better off regions tend to produce more highly skilled education-leavers. For instance, the Social Mobility Commission has found that better off regions, and in particular London, outperform the rest of the country in terms of the proportion of young people from disadvantaged backgrounds that attain 'good' GCSEs in Maths and English[17], as well as the proportion from disadvantaged backgrounds who go on to university.[18]

So while the figures here cannot speak to the relative effects of a region's educational provision and inward migration, they do highlight that despite strong qualifications growth across the country over the past two decades, those regions that started out behind the pack have struggled to make relative gains. As with persistent attainment gaps in relation to socioeconomic background, this is a more worrying trend.

On the eve of Brexit, then, Britain finds itself far more qualified than it was just two decades ago. This has been the product of rising levels of educational attainment in successive cohorts of young adults entering the workforce – the focus of our discussion given that inflow profiles tend to be the margin by which workforce skills are improved. In terms of how the effects of rising attainment have been distributed, there is good news in relation to sex and ethnicity, where previously low-performing groups such as black and Indian women now have above-average educational attainment. But large gaps persist in relation to geography and social class, where there is some evidence of prior advantage being maintained or even amplified.

Closing these gaps requires the education and skills system to both keep delivering rising attainment and to ensure the rewards are directed to the groups and areas currently left behind. This does not augur well in light of the topic we explore in the following section: the rate of attainment growth appears to have slowed markedly over recent years.

[16] C Bosquet & H Overman, 'Why does birthplace matter so much?', *Journal of Urban Economics*, 110, March 2019
[17] Equivalent to grades A*-C or since 2018, grades 9-4.
[18] Social Mobility Commission, '*State of the Nation 2017: Social Mobility in Great Britain*', November 2017

Section 3

Attainment slowdown

The previous section documented striking improvements in educational attainment over the past two decades or so; this section focuses on the slowing pace of change in the latter half of that period. During the late 1990s and early 2000s, the qualifications held by young people flowing into the labour market rose at an astonishing rate: year on year, the average increase in the share of 25-28 year olds with a Bachelor's degree or higher grew by 1.8 percentage points; the share with GCSE-equivalent or lower qualifications reduced by an average of 2.3 percentage points.

These rates more than halved from 2004: over 2004-10, the average annual increase in Bachelor's-degree-and-higher attainment fell to 0.7 percentage points; the reduction in those with GCSE and lower qualifications fell to just 0.3 points. These rates of change have improved slightly but are yet to approach their 1997-2003 levels. This qualifications slowdown was not driven by a particular set of regions nor by a particular demographic group: it was (like qualifications growth itself) very broad based.

Given that rising educational attainment is a key driver of productivity and therefore pay, this slowdown appears problematic. You might conclude that it is not, however, if it had been exacerbated by rising migration over the same period or if it signified Britain simply reaching a skills saturation point. But there is no evidence that either of these counterarguments holds water. Rather, the implication is that the educational attainment slowdown is the product of the skills supply system that young people interact with, and it is by expanding that supply that attainment growth can be accelerated.

The pace of attainment growth has more than halved since the early 2000s

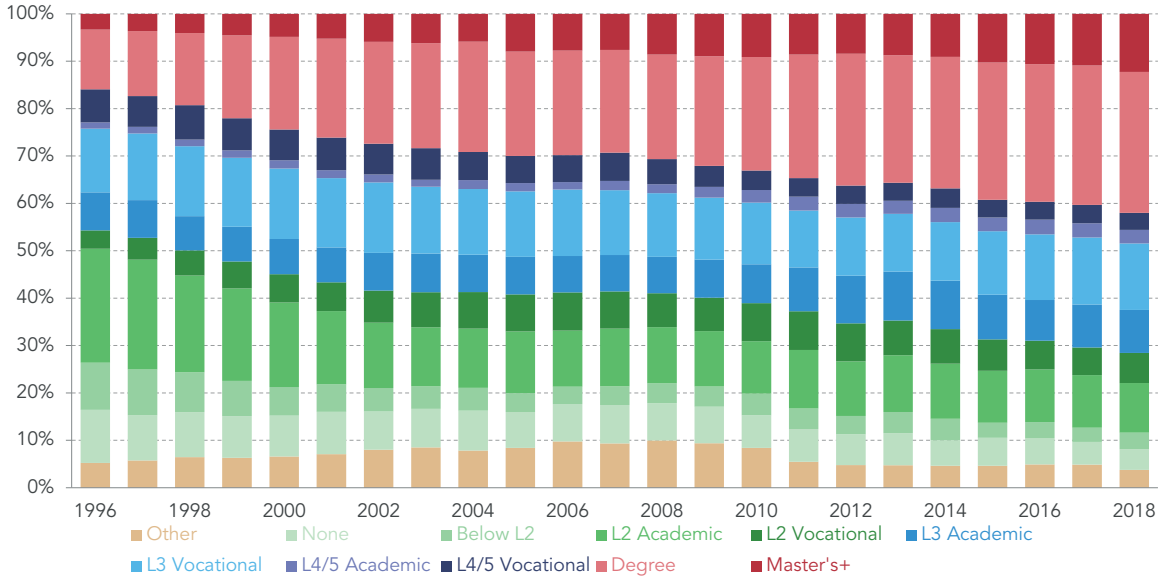
Section 2 highlighted the extent to which the country's human capital base has grown over the previous two decades. These large-scale shifts were mostly driven by flows of increasingly educated young people into the labour market: year on year, young people entering work have had, on average, higher qualification levels than those who came immediately before them.

This is a familiar story: every August, news headlines record the triumphs (and disappointments) of A level results day, often commenting on the record proportion of young people being accepted to university. And yet, there has been comparatively little notice paid to the fact that the rate of attainment growth has declined. In other words, the average year-on-year increase in the share of young people with higher-level qualifications has slowed down, just as the average year-on-year reduction in the share of young people with low-or-no qualifications has fallen off. This human capital 'slowdown', while less-often commented on, raises a number of risks: from limiting the spread of opportunity across geographies and social background, to stifling the supply of candidates available to fill in-demand and specifically-skilled roles in the labour market.

Figure 12 helps to illustrate this slowdown: it presents a time series of educational attainment among 25-28 year olds between 1996 and 2018. While the late 1990s were characterised by large year-on-year changes in attainment across all mid- and higher-level qualifications, the level of annual change appears to have declined from the mid-2000s. Each year, attainment levels grow, however the size of that year-on-year growth has been smaller over recent years than it was during the late 1990s and early 2000s.

Figure 12: The late 1990s and early 2000s were characterised by large-scale changes in educational attainment

Highest qualification held by 25-28 year olds



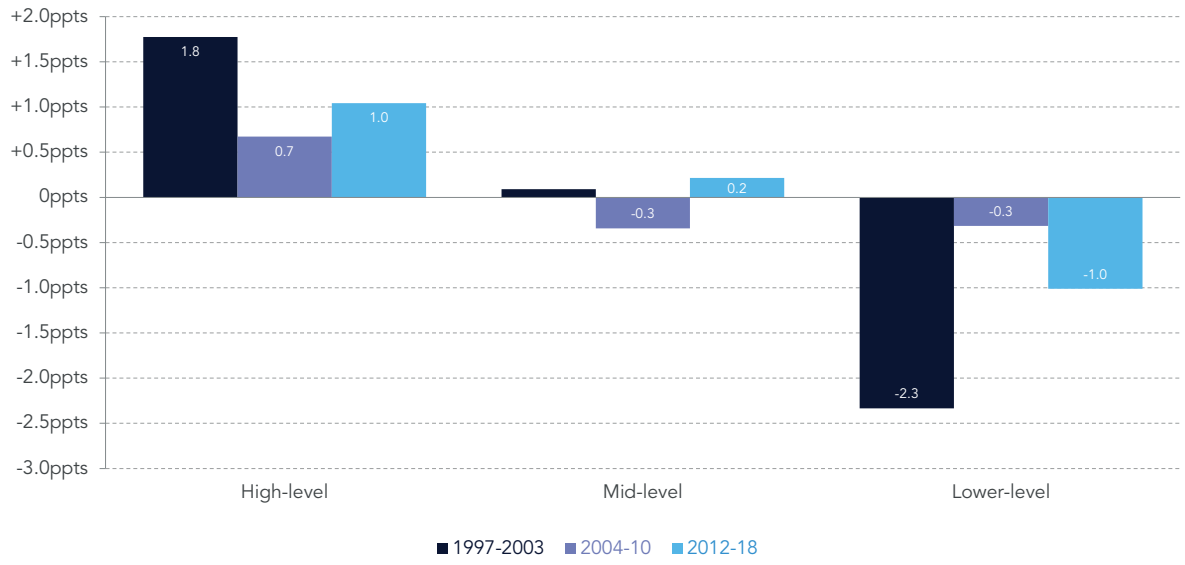
Source: RF analysis of ONS, *Labour Force Survey*

Notably, Master's degrees and higher are the only qualification level not to have experienced a particularly sharp slowdown. This could reflect the endurance of the effectively maintained inequality pattern discussed in Section 2: as Bachelor's degrees become the new norm, younger people from more advantaged backgrounds have increasingly taken up Master's degrees – perhaps as a means of differentiating themselves in the labour market.

Figure 13 provides a clearer sense of the slowing pace of attainment growth, illustrating the average year-on-year change in the highest qualifications held by 25-28 year olds over three different time periods: 1997-2003, 2004-10 and 2012-18. On average, in each year between 1997 and 2003, the share of 25-28 year olds with a degree grew by 1.8 percentage points and the share with GCSE A*-C-equivalent and below qualifications fell by 2.3 percentage points.

Figure 13: Across all qualification levels, the pace of change in educational attainment has slowed

Average annual percentage point change in highest qualification held by 25-28 year olds



Notes: Due to a change in *Labour Force Survey* coding of foreign qualifications that took place in 2011, year-on-year change between 2010 and 2011 is removed from this analysis.
Source: RF analysis of ONS, *Labour Force Survey*

The pace of change dropped dramatically in the periods that came after: year-on-year growth in the share of young people qualified to Bachelor's degree level or higher more than halved from an average of 1.8 percentage points during 1997-2003 to just 0.7 percentage points during 2004-10. The year-on-year reduction in the share of young people qualified to GCSE level or below fell even further: from an average of 2.3 percentage points during 1997-2003 to 0.3 percentage points during 2004-10.

Attainment growth recovered only slightly, for some education levels, during the third period that we focus on (2012-18), but even the latest pace of change remains well below our starting period: the rate of change in the share with degrees and higher grew from 0.7 percentage points during 2004-10 up to 1 point in 2012-18. The rate of reduction in GCSE and below qualifications increased slightly, from 0.3 percentage points to 1 percentage point.[19]

[19] In 2011, there was a change in the method that the *Labour Force Survey* used to classify qualifications awarded abroad, resulting in an immediate fall in the proportion of non-UK born adults with qualifications classed as 'other,' and a rise in the share with Bachelor's degrees between 2010 and 2011. We account for the effects of this classification change by removing 2011 (i.e. the year that experienced the classification-driven 'bump' in degree attainment) from our analysis.

The halving of attainment growth has been broad based

Importantly, the slowdown in attainment growth has not been skewed by the dominant effects of a particularly large region or subgroup of young people. In other words, the slowdown did not come about because the limits to attainment had been reached in already highly skilled cities or regions or among groups perceived to have had a longstanding advantage in educational attainment. By contrast, the slowdown was relatively broad based. Figure 14 helps to illustrate this by breaking down the average year-on-year change in the share of young people with degrees or higher, according to region and according to the interaction between sex and ethnicity.

Two things are clear: first, the size of the initial pace of change (1997-2003) varied across region and group. Whereas in inner London, the average year-on-year growth in graduates was as high as 3.3 percentage points during this time period, it was 2.1 percentage points in metropolitan West Midlands and just under 0.7 percentage points in Merseyside.

The second, and more important, pattern in Figure 14 relates specifically to the attainment growth slowdown described above. Across every group and region, average annual growth in the share of young people with higher-level qualifications has fallen since the 1997-2003 period. Only in Merseyside has the latest period of attainment growth (2012-18) caught up with, and exceeded, 1997-2003. In inner London, higher-level attainment growth slowed from 3.3 points in 1997-2003, to 1.9 points 2004-10 and 1.2 in 2012-18. In metropolitan West Midlands it fell from 2.1 points in 1997-2003 down to just 0.7 in both 2004-10 and 2012-18.

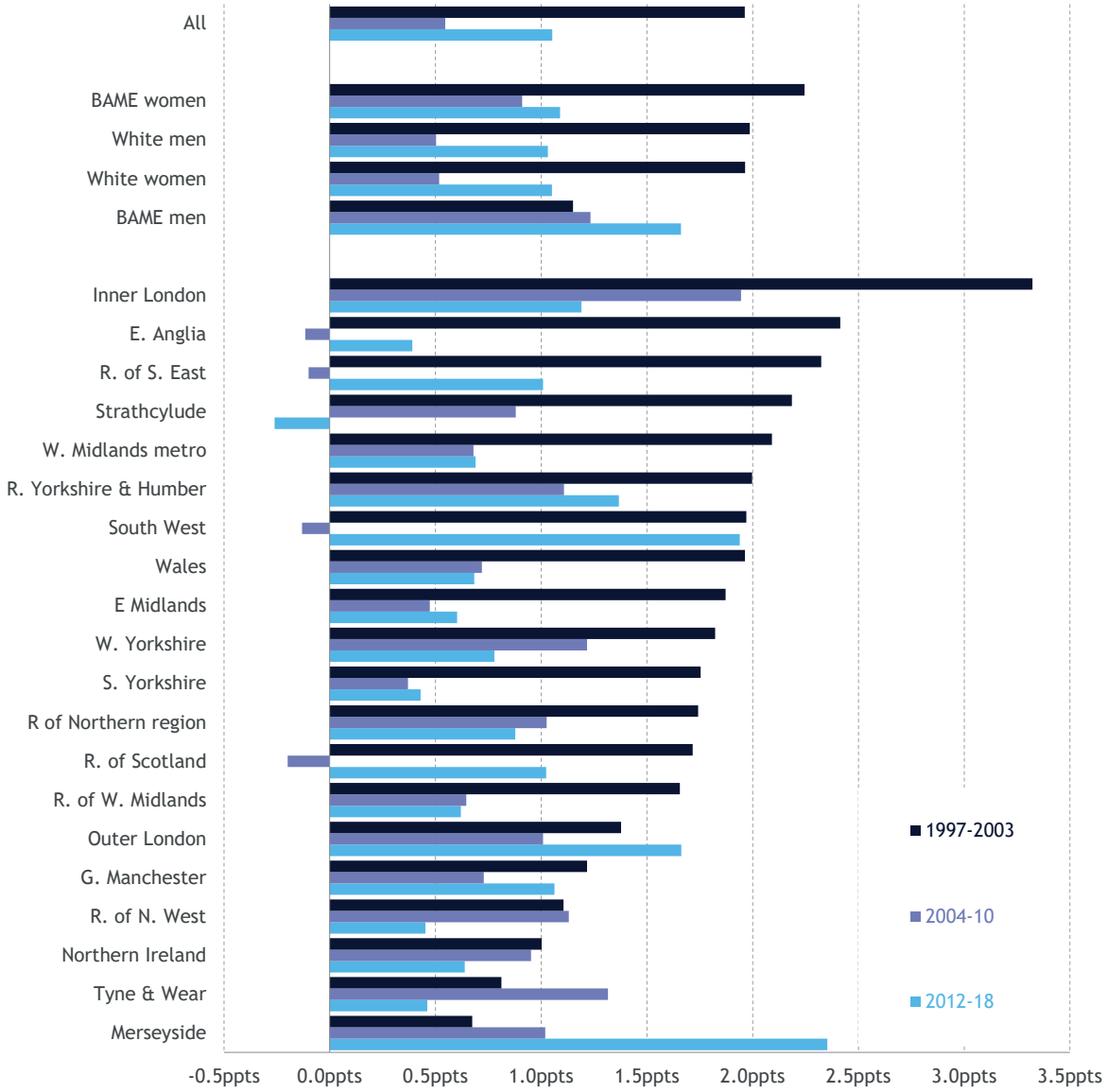
The slowdown has also occurred across sex and ethnic minority status, with the notable exception of men from a Black, Asian or other ethnic minority (BAME) background. The average annual rate of higher-level attainment growth among women from a BAME background more than halved from 2.2 percentage points in 1997-2003 to just 0.9 points in 2004-10. Although the growth rate then recovered slightly (to 1.1 percentage points) in 2012-18, it still remains half the size of the 1997-2003 rate. Among white men and women, these figures were 2 percentage points in 1997-2003 and 0.5 points in 2004-10, with a (very slight) recovery, to 1 point in 2012-18.

When compared to the rest of the population, BAME men displayed slightly smaller average annual growth rates to begin with (1.2 percentage points 1997-2003 as compared to 2 percentage points for white men and women and 2.2 percentage points for BAME women). However, they were only group to have experienced welcome, albeit slower growth over the third period, from 1.2 percentage points in 2004-10 to 1.7 points in 2012-18.

A slowdown in educational attainment growth occurring across both richer and poorer regions, as well as within different sexes and ethnicities, is the opposite of what is needed to make progress on closing the attainment gaps discussed in Section 2. The ability of Tyne & Wear, where currently less than one-third of 25-28 year olds have a degree, to catch up with inner-London (where nearly three-in-four do) requires a fast pace of growth and a degree of targeting in terms of where that growth happens.

Figure 14: Attainment growth has slowed across regions, sexes and ethnicities

Average annual percentage point change in the share of 25-28 year olds with a degree or higher, by region, sex and ethnicity



Source: RF analysis of ONS, *Labour Force Survey*

This slowdown matters because improvements in educational attainment are a key route to higher living standards

Our views on this slowdown are determined by the case we made for the importance of a focus on improving workforce skills in Section 1: rising educational attainment is a driver of productivity improvements, which determine real pay improvements in the long run. On this basis, slowing educational attainment growth is self-evidently a problem for those concerned about driving Britain towards higher living standards. That conclusion can be

drawn before we consider skills challenges in the context of a post-Brexit immigration regime. Indeed, the skills challenges or opportunities associated with Brexit only underscore the problem posed by slowing attainment growth.

However, there are reasons some might argue that we should be relaxed about the human capital slowdown we have detailed. We tackle the two main counterarguments to our conclusions below.

The slowdown in educational attainment growth was not driven by migration, which in fact masked its depth

One could draw a correlation between the timing of the attainment slowdown and the rise in inward migration: the qualifications slowdown roughly coincided with the Citizens Rights' Directive, which in 2004 extended to the right to live and work in the UK to all citizens from the European Economic Area, including the 10 central, eastern and southern European countries that acceded to the EU in 2004.[20] The subsequent rise in the number of migrants entering the labour force was notable: between 2003 and 2018 the share of the UK's 22-64 year old population born abroad (all countries – not just those now part of the EU) grew from 10 to 19 per cent, while the share from the EU more than trebled, from 2 to 7 per cent.

The coincidence of these trends – slowing educational attainment growth and rising migrant inflows – might lead to the supposition that they are related. One hypothesis could be that an inflow of well-educated migrants relieved some of the country's demand-driven education and training needs. Yet the very fact that the slowdown occurred, regardless of rising migrant numbers, suggests this is unlikely to be the case.

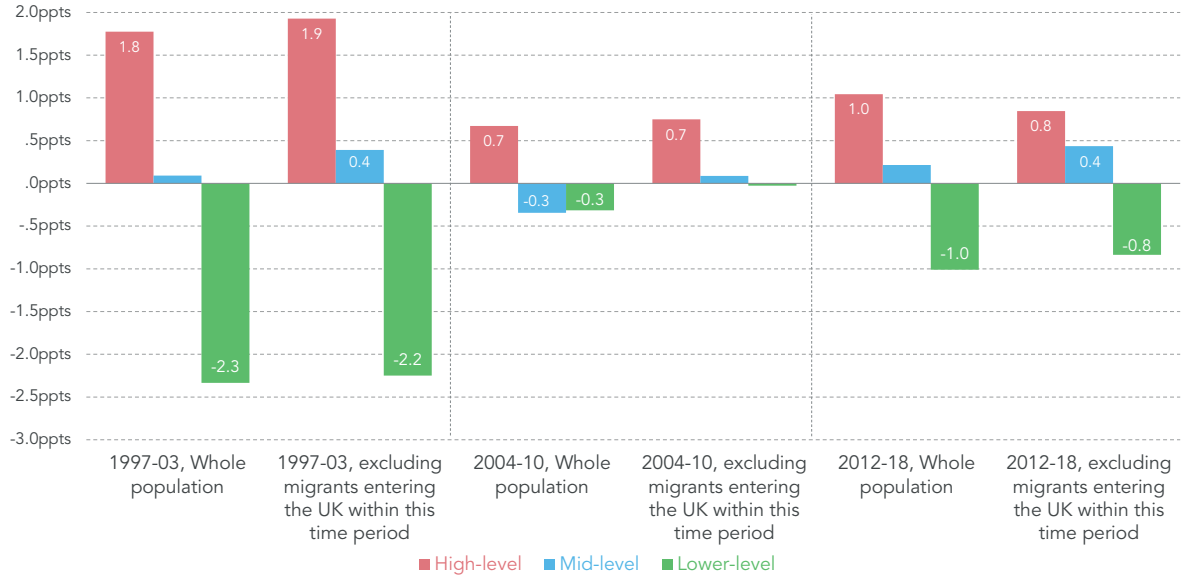
An alternative hypothesis is that inflows of lower-educated migrants from the EU following expansion were partly responsible for the slowing pace of attainment growth. Despite the similar timing, however, the rise in migrant numbers appears to have had little effect on the slowing pace of educational attainment that occurred among the 25-28 year old population; in fact over the most recent period the inflow of migrants appears to have slightly masked the extent of the qualifications slowdown.

Figure 15 helps to illustrate this by tracking the average annual change in the share of 25-28 year olds with higher (degree and above), mid-level (A level equivalent and sub-degree higher education) and lower-level (GCSE A-C* -equivalent and below) qualifications for the 1997-2003, 2004-10 and 2012-18 periods. Within each time period, it gauges the effects of migration on attainment growth by comparing the rate of attainment change for the entire population against the rate of attainment change among the population excluding those migrants who moved to the UK during those years.

[20] These countries are Malta, Cyprus and the 'A8': Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.

Figure 15: Migration has had little effect on the attainment slowdown

Average year-on-year change in the proportion of 25-28 year olds with higher, mid- and lower-level qualifications, with and without migrants arriving during the period



Notes: 'Migrants' indicate all those born abroad.
Source: RF analysis of ONS, *Labour Force Survey*

The within-time-period differences are minimal: the share of 25-28 year olds with degrees or higher grew by an annual average of 0.7 percentage points per cent over the 2004-10 period; were we to remove from our sample migrants who entered the UK during 2004-10 (i.e. the period immediately after the EU's 2004 expansion) there still would have been an average annual growth rate of 0.7 points. During 2012-18, the share of 25-28 year olds with degrees grew by an annual average of 1 percentage point; removing recently arrived migrants would have served to (slightly) dampen that growth further, to an annual average of 0.8 points.

There are a number of reasons for the relatively small effect that the migrant flows have had upon the UK's rate of qualification change. Chief among them is size: while the absolute number of migrants entering the UK labour market did indeed grow during each of the three time periods, numbers were not large enough to have any substantial effect in either direction on the stock of skills. Within the total share of foreign-born 25-28 year olds, growth was largest among those from the 'A8' countries (the eight central and Eastern European countries that joined the EU in 2002) as well as Bulgaria and Romania, which joined in 2007 and had transitional controls lifted in 2014. And yet, the proportion of 25-28 year olds that hail from these countries remains small relative to the wider population (in 2018 5 per cent were from the A8 and 2 per cent from Bulgaria and Romania combined). As such, this inward migration is unlikely to have a substantial effect on the rate of qualification change across the wider population.

Second, migrants have long entered the UK with higher levels of attainment than their UK-born counterparts: in 2003, 39 per cent of foreign-born 25-28 year olds were qualified to degree level or higher, excluding qualifications classed as 'other.' Among UK-born 25-

28 year olds that figure was just 30 per cent.[21] In 2018, these figures were 60 and 40 per cent, respectively – underlining the point that the UK's migrant population has served to boost its overall stock of human capital, even if the effect of migrant inflows on the rate of qualifications change has been both smaller and more gradual.

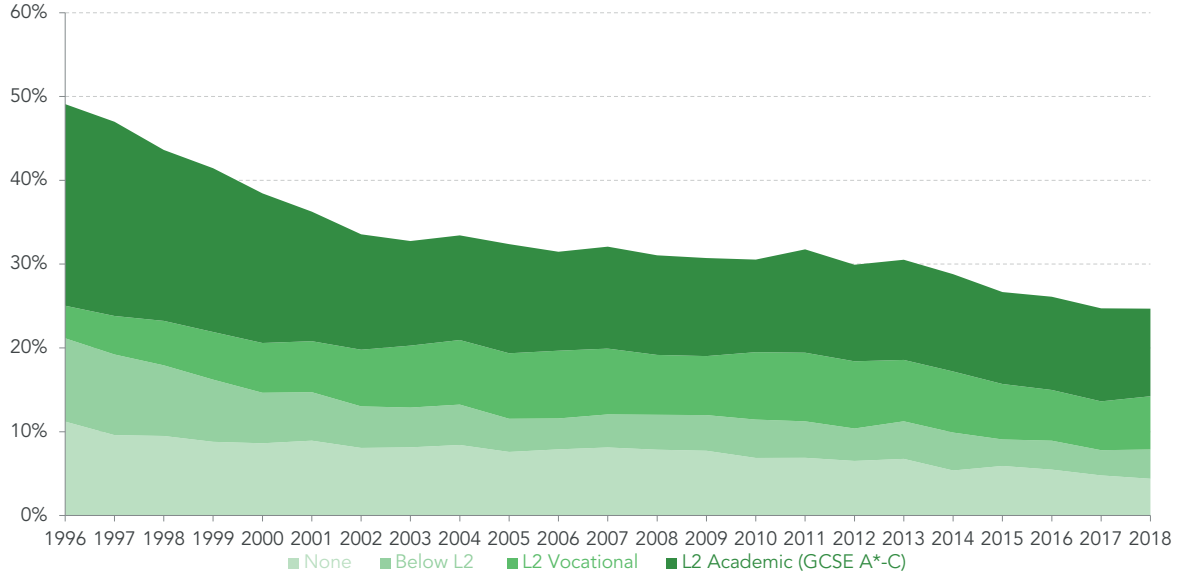
The slowdown in educational attainment growth doesn't reflect Britain reaching a skills saturation point

The second reason we might be relaxed about the slowdown in educational attainment growth is if it reflects us simply reaching the limits of educational improvements. While a detailed study of the relative demand for different types of skills and qualifications is beyond the scope of this analysis, the evidence suggests that we are a way off saturation point in terms of overall skill levels.

The UK's remaining stock of people with low-or-no qualifications is a manifest demonstration that we have not yet reached the limits to attainment. Currently, more than a quarter of young people enter the labour market with lower-level or no qualifications (i.e. GCSE A*-C-equivalent and below). Figure 16 shows that after substantial reductions during the late 1990s and early 2000s, more than a quarter of today's 25-28 year olds are still only qualified to, at most, Level 2.[22]

Figure 16: One-in-four young people have not achieved any qualifications above GCSE-level

Share of 25-28 year olds qualified to GCSE-equivalent level or below, by qualification type



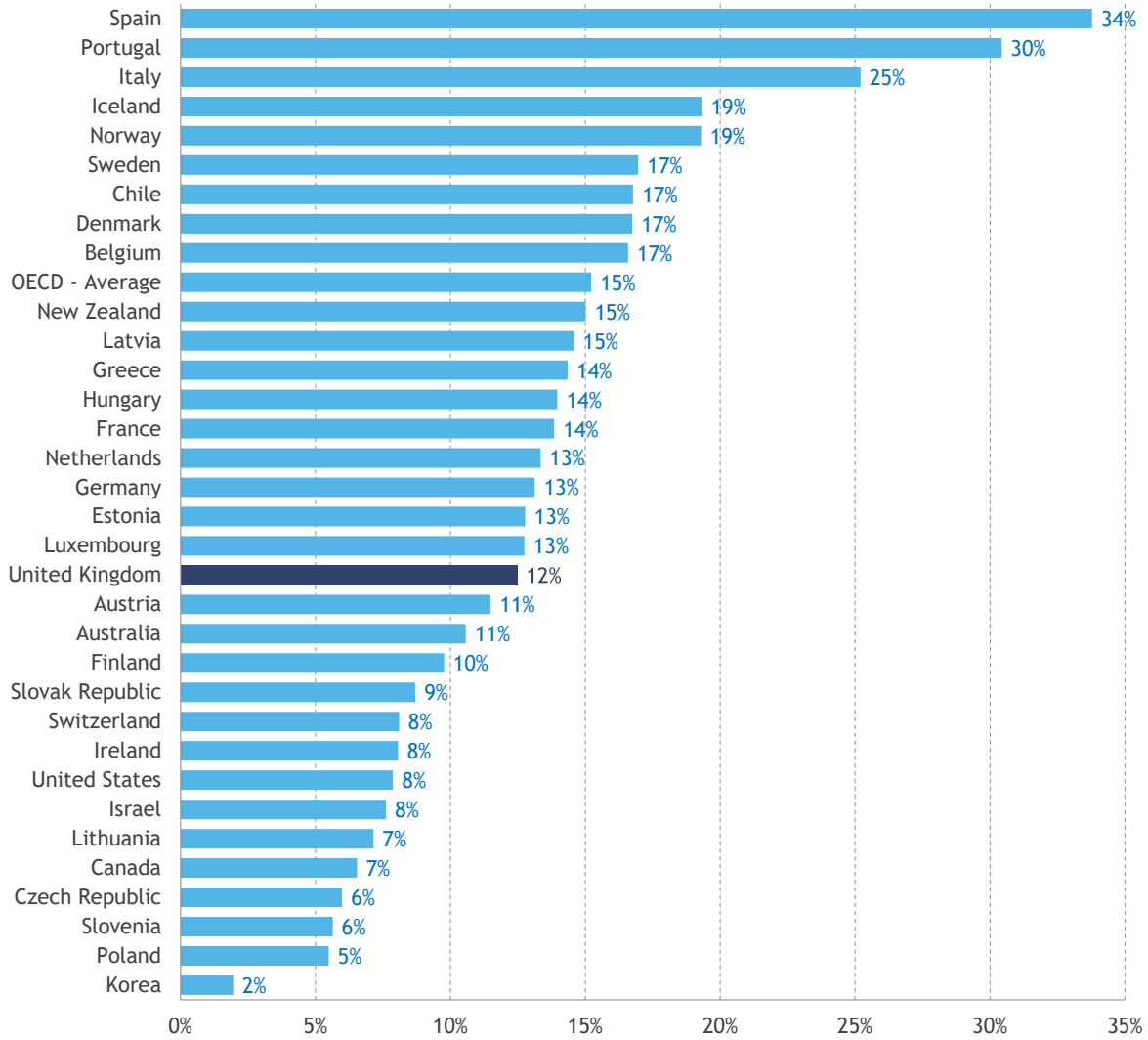
Source: RF analysis of ONS, *Labour Force Survey*

[21] Prior to 2011, the *Labour Force Survey*'s classification of foreign-awarded qualifications may have underestimated the share of migrants with Bachelor's degrees.
[22] This share of lower-qualified 25-28 year olds would be larger were migrants removed from the population: for instance, during 2018 25 per cent of the total 25-28 year old population had lower-level/no qualifications; without migrants 27 per cent did.

Compared to other English-speaking countries, the UK appears unique for having such a large share of lower-qualified young people. While drawing clear, cross-country distinctions between education levels can be tricky, OECD data suggests that the UK has many more young adults with low-level (below GCSE A*C-equivalent) qualifications (13 per cent) than other English-speaking countries including Canada (7 per cent), the US, Ireland (8 per cent each) and Australia (11 per cent). In short this international comparison lends little credibility to skills saturation arguments, and makes clear that if we wanted to go further, we could.

Figure 17: The UK has a larger share of low-qualified young people than many other OECD countries, including Canada, the US and Australia

Proportion of 25-34 year olds with below GCSE-equivalent qualifications, selected OECD countries: 2017



Notes: Figures refer to the proportion with 'below upper-secondary' education. Upper-secondary, here, can includes both GCSE and A level-equivalent qualifications. However, drawing clear qualification level distinctions across countries is subject to error as the process can gloss over more nuanced differences that exist between different countries' education systems.
Source: OECD, *Education at a Glance*, 2017

While the UK has a larger share of low-qualified young adults, it also stands out for having experienced a slowdown in tertiary-level attainment that was more rapid than in most other countries. Previous Resolution Foundation analysis comparing tertiary attainment among the 1963-72, 1973-82 and 1982-91 cohorts in ten OECD countries found that only France and Spain experienced slowdowns comparable to that of the UK.[23]

The implication is that our skills supply system has contributed to the educational attainment growth slowdown

Neither the fact that we have reached a skills saturation point nor the effects of migration appear to have driven the attainment slowdown we outline here. The implication is that at least some of the slowdown's roots are laid in policies related to skills supply.

It is beyond the scope of this report to provide a full account of changes that may have held back skills supply, but by way of discussion here we provide a couple of headline thoughts. One is drawn from analysis from the Institute for Fiscal Studies (IFS), which documents substantial reductions over the late 1980s in the proportion of 16 and 17 year olds leaving the formal education system, and a consequent rise in the share studying in schools and colleges. The relative share of this age group sitting inside the formal education system then rose at a lower rate from the mid-1990s until today.[24]

The initial 'boost' in study could in part have been driven by changing attitudes towards education that developed towards the end of the 1980s, particularly including the 1988 introduction of GCSEs, which, without the ceiling on pass numbers that existed under the previous O Level examination system, led to a substantial rise in the proportion of older teenagers 'staying on' in school after age 16.[25] Without subsequent changes to encourage more students to advance to higher levels, progress has stalled since.[26]

Beyond this, it's quite possible that demographics have played a role: rising numbers of 18 year olds from 1996 onwards meant that further and higher education institutions needed to grow the number of places available year-on-year just to keep educating each cohort at the same rate. Persistent declines in further education funding may have acted as a headwind to or had a destabilising effect on this growth.

While the supply of qualifications ultimately appears responsible for shaping their uptake (and by extension, the pace of change) among young people flowing into the labour market, employers interact with this supply in two ways. In the first instance they serve as skills consumers: vacancies and their associated levels of pay help to signal relative

[23] F Rahman & D Tomlinson, *Cross countries: international comparisons of intergenerational trends*, Resolution Foundation, January 2018
[24] C Belfield et. al, *2018 Annual report on education spending in England*, Institute for Fiscal Studies, September 2018
[25] Blanden et. al, 'Changes in educational inequality,' *The Centre for Market and Public Organisation*, Department of Economics, University of Bristol, 2003
[26] There have since been policy proposals that aimed to reshape young people's education at Levels 2 and 3. For instance, the 'Working Group for 14-19 Reform,' which was led by Sir Michael Tomlinson and reported in 2004 proposed replacing GCSEs, A levels and vocational qualifications with a unified framework for 14-19 year olds. It was, however, rejected. Government plans for new technical Level 3 qualifications, 'T levels,' are currently in train. 'T levels' will offer a core suite of skills around numeracy and literacy and allow students to specialise in one of 15 technical subject areas, with a work placement in the second year. These will run separate from A levels and other vocational qualifications at Level 3; students will have to choose between studying for a T level or other types of Level 3 qualifications.

demand for particular qualifications and skills. In the second, they act as suppliers themselves: firms have long sought to improve productivity by providing training and development in areas best taught on the job, or by providing a boost to lower-educated workers whose productivity would benefit through an improved set of basic skills.

By way of assessing where in the economy an acceleration of educational attainment growth is likely to be most needed, in the next section we assess these two roles.

Section 4

The demand for more

Having documented the slowdown in educational attainment growth in the previous section, we next turn to the level – and shape – of employer demand for different sets of qualifications and skills. The purpose of the analysis is not to draw firm conclusions about aggregate levels of skills demand, but to assess the areas of the economy in which the effects of an acceleration in attainment growth may be biggest.

We begin by outlining the current size and distribution of skill shortages: roles where employers cannot recruit difficult for skill-related reasons. High skill shortage roles exist across employee qualification levels, and include gardeners, mechanics, software designers, electrical fitters and nurses. The implication is that easing today's recruitment difficulties requires a focus not just on higher-level academic qualifications – though there is merit to this – but also on a range of mid- and higher-level technical and vocational qualifications. These are prime candidates for restarting attainment growth in a way that matches current demand.

The potential for reduced migration in the wake of the UK's exit from EU has put current skill shortages under a spotlight. This section highlights roles (occupations within industry) that have an above-average skill shortage density, an above-average share of migrants, and pay under proposed migration salary thresholds. Although this analysis cannot predict the effects that reduced migration would have on the shape of different sectors, nor on future demand for labour, it does highlight areas in which employers are likely to face short- to medium-term skills and staffing pressures, including in terms of chefs, drivers and builder's assistants. We find that 26 per cent (1.4 million) of employed migrants in the UK work in roles with above-average skill shortage densities and earn below the proposed salary thresholds for their occupation.

Although employers are right to be concerned about short- to medium-term challenges in recruiting appropriately skilled workers, they have presided over longer-term challenges that affect the skills and productivity of their existing staff. Namely, employers offer less-frequent training to workers with lower (as opposed to higher)-level qualifications, and they specifically offer less training to workers whom they say lack the skills necessary to be proficient in their role. In addition to the fact training rates have fallen for workers in most occupations, the length of training has fallen across all.

Employers' existing hiring difficulties tell us where an acceleration in skills supply could have the biggest impact on the econom

The previous section concluded by pointing the finger at supply – the education system with which young people interact (largely) before they enter the jobs market – as a driver of the slowdown in rates of improvement in educational attainment over recent decades. In this section we turn to the perspective and role of firms, in terms of what their skills demands are and the role they play in meeting this demand by training and upskilling their own staff.

Estimating aggregate employer demand for (certain types of) qualifications and skills is difficult, with measures of qualifications' relative pay 'premia', or the match between qualifications and occupations, both complex and contentious (see Box 1 for a summary of the extensive body of research in these areas). Exploring these measures in order to estimate trends in relative demand over time – and therefore where the limits of demand might be – is beyond the scope of this report. (Annex 2 provides employment, pay and training figures for detailed qualification levels.) But in the previous section we made the case that wherever the limits of demand may be for particular qualifications, we are not there yet in terms of aggregate skill levels. As such, in this section we provide a snapshot of the types of jobs that employers report lacking access to suitably skilled people for, by way of assessing the areas in which the effects of an acceleration of attainment growth may be biggest.

i Box 1: Demand for skills, graduates in non-graduate jobs and qualifications' pay premia – the state of the debate

Questions about whether the country's supply of qualifications matches the labour market's demand are both longstanding and contentious. The answer varies widely according to how 'demand' is defined and measured, with most methods suffering from one shortcoming or another. For instance, surveys have directly asked both employers and employees whether the qualifications that they (or their staff) have are necessary for the jobs they do. Although they provide a useful gauge for how individuals perceive the link between education and on-the-job requirements, answers are ultimately prone to bias and subjectivity.[27]

Other measures assess the tasks and skills used in particular occupations and then determine whether or not those occupations would require the skills and knowledge attained through a degree. Different 'graduate job' indicators produce different results. Recent ONS

[27] For instance, the OECD's 2013 Survey of Adult Skills found that although, compared to other OECD countries, England and Northern Ireland had a large share of adults (30 per cent) who reported having higher qualifications than necessary for their job (i.e. 'over-qualification'), they also showed, through testing, to have one of the lowest rates of 'over-skilling' – where an adult's literacy skill is above the minimum required for their job (fewer than 10 per cent). The contrast between relatively high rates of reported over-qualification, but relatively low rates of reported over-skilling, helps to highlight why subjective measures of over-qualification should be taken with a grain of salt. See: OECD, *Survey of Adult Skills First Results: England and Northern Ireland*, 2013

figures indicate that 37 per cent of working age graduates across the UK worked in a 'non-graduate' role during 2017.[28] Alternatively, researchers at University College London, using a different classification method, found that roughly 30 per cent of graduates were in 'non-graduate' roles – a figure that held steady from 1997 to 2012, despite a 10 percentage point rise in the share of graduates in the labour market over the same time period.[29] Of course, defining the particular set of tasks performed and competencies used in a role (and linking them to the skills developed through a degree) is typically a subjective exercise. These methods are also open to risk that occupational tasks and requirements evolve at a faster pace than the classification systems used to define them.

Most commonly, researchers look to pay as an indicator of the extent of labour market demand for different qualifications. The graduate premium – defined as the relative difference between median wages for graduates and wages for non-graduates – is often cited. The overwhelmingly poor performance of pay across qualification levels over the past decade perhaps limits its usefulness as an indicator of relative demand. Notwithstanding this, recent research from the IFS found that while wages for both graduates and 'school-leavers' (those who left education with GCSEs) age 25-28 have fallen since the financial crisis took effect in 2008, the relative difference in wages between the two has held steady at roughly 35 per cent over the past two decades. This comes despite the fact that the share of 25-29 year olds with degrees has grown from 13 to 41 per cent over the same time period.[30]

However, by focusing on the median, pay-premium estimates often sidestep questions about variation in graduate outcomes. Research indicates that the variation in earnings outcomes for graduates has indeed increased over time (in line with a wider expansion in HE participation),[31] while administrative data that links graduates' earnings to their complete educational history can provide a clearer illustration of variation. For instance, recent research found that 99 per cent of female graduates but just 67 per cent of male ones (85 per cent of all graduates) were paid more than their counterparts without a degree by age 29.[32] Additional analysis using some of the same administrative data found that in 2015-16, median pay among graduates who had left university five years prior ranged from just £19,700 (females who studied agricultural related subjects) to £49,100 (men who studied medicine and dentistry).[33]

Median pay figures vary even more widely when additional factors, including subject within university, are considered. Ultimately, however, these estimates are complicated both by

[28] Office for National Statistics, *Percentage of employed graduates in non-roles, parts of the UK,* 2015-17, 26 April 2017
[29] F Green & G Henseke, *The changing graduate labour market: analysis using a new indication of graduate jobs*, Centre for Learning and Life Chances in Knowledge Economies and Societies, 2014.
[30] Blundell et. al, *The puzzle of graduate wages* Institute for Fiscal Studies, August 2016
[31] Hussain et. al, *University quality and graduate wages in the UK*, Centre for the Economics of Education, March 2009
[32] Belfield et. al, *The impact of undergraduate degrees on early-career earnings*, Institute for Fiscal Studies, November 2018
[33] Department for Education, *Graduate outcomes (LEO): 2015 to 2016,* March 2018

factors that the data cannot account for (for instance, the administrative data cited above does not indicate where a person lives, and as such it cannot account for regional variation in pay) and by factors that post-18 educators have little control over, such as prior attainment and family background. For instance, analysis from the IFS shows that even after controlling for university attended and subject studied, graduates from higher-income families earn 10 per cent more than their lower-income counterparts.[34]

Our measure of employer-reported skill shortages is taken from the *Employer Skills Survey* (ESS), which asks a large sample of firms the number and proportion of their vacancies they have been unable to fill due to a lack of suitably skilled applicants. The most recent ESS found that there were 226,000 skill shortage vacancies (SSVs) across the UK in 2017 – equivalent to 22 per cent of all vacancies, and spread across 6 per cent of firms.[35] This figure has risen from 91,000 in 2011, 146,000 in 2013 and 209,000 in 2015, to a large extent reflecting a growing economy and growing vacancy rates as the jobs market strengthened following the financial crisis. The 'density' of skill shortages (SSVs as a proportion of all vacancies) has stayed flat over the past four years (after rising between 2011 and 2013, with 2011 likely reflecting a cyclical dip).[36]

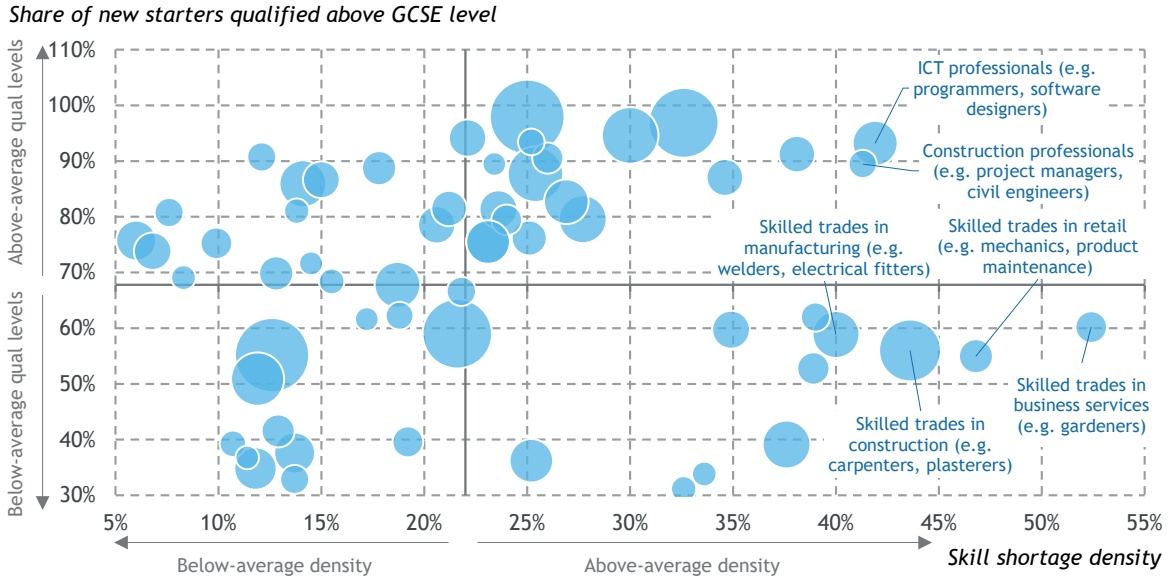
Aggregate levels of employer-reported skill shortages should of course be interpreted with a pinch of salt. It could be, for instance, that the pay, conditions or location attached to a share of roles will always deter suitably skilled applicants from applying. And as we have discussed, trends over time are likely to be partly cyclical, both in terms of vacancy numbers and the degree of labour market slack that employers can tap into. Nonetheless, the relative differences in skill shortage density across sectors and occupations provides a direct lens on the types of qualifications and skills that businesses want, but can't readily access.[37] An acceleration of supply in these areas could reasonably be expected to have a strong read-across to an expanding economy and decent job prospects for younger cohorts coming though.

As a way in to thinking about the link between employer-reported skill shortages and the supply of qualifications, Figure 18 plots the average skill shortage density of certain job 'roles' (defined by intersecting high-level sector and occupation categories[38]) against the average qualification level of people working in these roles for less than two years. This analysis is based on matching the average employer-reported skill shortage density for each job role in ESS to information about individuals working in those roles captured in the Labour Force Survey.

[34] Britton et. al, *How English domiciled graduate earnings vary with gender, institution attended, subject and socio-economic background*, Institute for Fiscal Studies, April 2016
[35] The 2017 ESS covered over 87,000 firms.
[36] In the 2011, 2013 and 2015 editions of the ESS, 16, 22 and 23 per cent of vacancies were classed as SSVs, respectively.
[37] It could be argued that it is the number of SSVs, rather than their density, that is most relevant to questions about where an acceleration in educational attainment would have the biggest effects. However SSV numbers in different parts of the economy are overwhelmingly determined by the size of sectors and occupations. This should be taken into account – one reason why we present skill shortage densities alongside employment shares – but for a clearer picture of *relative* demand we chose to focus on densities rather than numbers.
[38] Sector/occupation combinations that comprise less than 0.5 per cent of all employment have been removed from the analysis; this removes particular combinations that are unlikely to exist, or are likely to be very small, such as caring roles in financial services.

Figure 18: Roles with high skill shortages draw from across the educational spectrum

Roles by skill shortage density and highest qualification held: 2016-18



Notes: Roles are defined by combining one-digit standard industrial classification (SIC) and one-digit SOC codes. Roles comprising less than 0.5 per cent of employment are excluded. Bubble size indicates employment share. New starters are those who have been with their employer for less than two years.
Source: RF analysis of ONS, *Labour Force Survey*; DfE, *Employer Skills Survey*

We find that roles with high skill shortage densities are spread across the qualifications spectrum, with no clear pattern of association. By their very nature, however, high skill shortage densities (i.e. a higher share of vacancies classed as SSVs) appear to be associated with roles that require specialist knowledge, skills or training. We also see considerable variation in skill shortage density across occupations and industries: only 7 per cent of vacancies for administrative roles in the health sector were SSVs, compared to 52 per cent of vacancies for skilled trade roles in the business services sector.

While there is no clear association between skill shortage densities and the qualification levels of new entrants to roles, delving within qualification brackets we do find an apparent relationship to pay. On average, those working in roles with an above-average skill shortage density are better paid, even after controlling for qualification. At the top end of the scale, median hourly pay for a Master's-educated 22-64 year old in a role that features below-average skill shortages was £17.32; median hourly pay for Master's-educated 22-64 year old working in a role with above-average skill shortages was £19.51. Towards the bottom of the scale, median hourly pay for GCSE-level educated adults in below-average skill shortage roles was £9.51; pay for their counterparts in above-average skill shortage roles was £10.39.

To some extent this might be self-fulfilling: skill shortages are associated with specific technical expertise and training, and roles in which (even similarly qualified) people have and use this expertise pay more than those that don't. It is also indicative rather than definitive, for example, we don't control for other characteristics like age and region, or examine the pay levels of advertised jobs as opposed to existing staff. Nonetheless, the

implication is that employer-reported difficulties in filling these skill shortage roles are more likely to be related to a lack of labour supply than to inadequate terms, and that the returns from addressing these shortages may be sizable.

To paint a more detailed picture of the parts of the economy in which skill shortages are greatest, Table 1 lists the 15 roles that have the highest skill shortage densities; example jobs in these roles; the size of each role (measured here as its share of total employment during 2016-18) and typical annual full-time-equivalent pay over 2016-18. In order to get a sense of the qualifications with which people typically enter these roles, it also shows the share of new starters who are qualified to degree-level or higher, the share with mid-level qualifications (e.g. A levels and sub-degree HE) and the share qualified to GCSE-equivalent levels or lower. (Annex 1 provides further information on skill shortages, skill gaps, pay, training and educational attainment for each of these occupation by industry roles.)

We find that in seven of the top 15 skill shortage roles, a plurality of new starters have mid-level qualifications and in five of these roles a plurality of new starters are qualified, at least, to degree level. Putting qualification levels to one side, the type of jobs included in each of these roles – from chefs, drivers and plumbers to software designers, underwriters and doctors – require a specific set of skills. Many (e.g. doctors, nurses, social workers, drivers) require a license to practice. And those skill shortage roles where the average qualification held is low nonetheless appear to require some specialist skills and training – for instance, operative and elementary roles in construction.

None of this is particularly surprising: it's something of a truism that roles in which employers are most likely to report a lack of suitably skilled applicants require specific and often technical expertise. But this analysis is nonetheless illuminating in terms of the areas of study and sectors of the economy in which increased skills supply should be a priority. While academic routes and higher-level degrees will undoubtedly have their role to play in addressing these shortages, the implication is that a range of mid- and higher-level technical and vocational qualifications – including but not limited to those delivered via degree courses – are prime candidates for restarting attainment growth in a way that matches current demand.

Table 1: Skill shortage density tends to be associated with mid- and higher-level qualifications, or specific trades

Top 15 skill shortage roles, examples jobs, employment share, pay and typical qualifications held by new starters: 2016-18

Role	Example jobs	Skill shortage density	Employment share	Median annual full-time-equivalent pay	Share of new starters with degree-plus qualifications	Share of new starters with mid-level qualifications	Share of new starters with qualifications at GCSE level or below
Skilled trades in business services	Gardeners, painters	52%	0.9%	£23,100	20%	40%	37%
Skilled trades in retail	Mechanics, product maintenance	47%	1.1%	£19,900	5%	50%	37%
Skilled trades in construction	Carpenters, plasterers, plumbers	44%	3.5%	£24,300	6%	50%	35%
ICT professionals	Programmers, software designers	42%	1.9%	£43,800	74%	19%	4%
Construction professionals	Project managers, civil engineers	41%	0.7%	£39,100	60%	30%	10%
Skilled trades in manufacturing	Welders, electrical fitters, machine setters	40%	2.0%	£23,700	10%	49%	33%
Skilled trades in energy & agriculture	Farmers	39%	0.8%	£24,500	14%	48%	32%
Skilled trades in hotel & restaurants	Chefs, catering managers	39%	1.0%	£17,000	11%	42%	35%
Manufacturing professionals	Production engineers, mechanical engineers	38%	1.2%	£38,800	65%	26%	8%
Transport & storage operatives	Drivers (HGV, van, bus)	38%	2.1%	£21,500	9%	30%	40%
Caring & leisure roles in arts & other services	Travel agents, leisure attendants	35%	1.3%	£15,700	10%	50%	37%
Associate professionals in financial services	Underwriters, investment analysts	35%	1.2%	£39,400	62%	25%	12%
Construction operatives	Scaffolders, mobile machine drivers	34%	0.6%	£23,000	6%	28%	49%
Healthcare professionals	Doctors, nurses, social workers	33%	4.5%	£33,700	80%	16%	2%
Elementary construction roles	Builder's assistants, handymen	33%	0.6%	£18,900	4%	27%	59%
Average across all employment		22%		£28,200	35%	33%	27%

Notes: Roles are defined by combining one-digit SIC and one-digit SOC codes. Roles comprising less than 0.5 per cent of employment are excluded. New starters are those who have been with their employer for less than two years. Full-time-equivalent annual pay is based on working 39 hours per week. Mid-level qualifications include A level equivalent qualifications and sub-degree higher education; qualification shares do not sum to 100 per cent because 'other' qualifications are excluded. Total hourly pay figure refres to 2017.
Source: RF analysis of ONS, *Labour Force Survey* and *Annual Survey of Hours and Earnings*; DfE, *Employer Skills Survey*

Skill shortage roles that are migrant reliant and pay below proposed salary thresholds indicate where skills demand may emerge post-Brexit

If that is where employer demand for more skills is most focused today, what might the future look like? To answer this question, we consider the context of proposed changes to the UK's migration regime associated with leaving the EU. As set out in Section 1, those on either side of the Brexit debate see this as either a skills opportunity – prompting us to focus on upskilling resident workers more than we have been – or a skills challenge – turning off the taps of skilled labour supply in ways that could have destabilising economic effects. Whichever one's position in this debate, considering where these effects are likely to be most keenly felt provides a window on future skills demand.

For that purpose, we add to the measure of average skill shortage densities in different roles used above two other considerations: the extent to which those roles currently employ people born outside the UK;[39] and the extent to which new entrants to them earn below the proposed salary threshold for the single skilled migration route. For those occupations already specified in the Tier 2 Visa code of practice, we use the minimum full-time-equivalent salary required for applications for 'new entrants'.[40] For all other occupations, we use the Migration Advisory Committee's (MAC's) proposed threshold of £30,000, which the government is consulting on following publication of the immigration white paper.[41] Of course, this immigration approach is not set in stone and changes to salary thresholds or shortage occupation lists are currently being considered by the MAC and others, so this analysis should be considered indicative rather than in any way definitive. But it nonetheless provides a good perspective on those bits of the economy that have previously relied on an inflow of workers from abroad, but may not be able to rely on this in future.

Another reason why this analysis is indicative and should not be treated as a prediction of changes to come is that sectors can change – often quite quickly – in response to labour supply shocks. For example moving to more capital-intensive business models, changing pay structures, or offshoring jobs. In addition, fewer (or different types of) migrants will have a bearing on demand in our economy as well as supply, which would in turn feed through to firms' needs for skilled workers. That being said, it is unlikely that migrants' effects on supply and demand – and employers' ability to respond to reductions in migrant labour supply – will be uniform across sectors. And in addition, transition to a new economic model will take time, so the short- to medium-term pressure of economic change is likely to be greater than the long-run effects of a different migration regime on sectors' skill needs.

On that basis, in what follows we examine where migrants currently work in the UK economy and the areas where the proposed future immigration regime might have the biggest impacts.

[39] Unless otherwise noted, migrants are defined here as individuals who were born abroad.
[40] In the current immigration system, new entrants are applicants under the age of 26 and those applying for certain types of graduate or post-study schemes. Because salaries for established workers are higher, our focus on new entrants provides a conservative estimate of potential effects. Source: Home Office, *Immigration Rules Appendix J: codes of practice for skilled work*, February 2016
[41] See: Home Office, *The UK's future skills-based immigration system*, December 2018

During 2016-18, nearly one-in-five 22-64 year olds in the UK was born abroad. 5.6 million migrants worked in the UK labour market, 2.3 million of whom were born in EU countries. Migrants work across a range of occupations and industries: in 2016-18 nearly one-quarter of 22-64 year olds in science, research and engineering professional roles were born abroad, as were 35 per cent of those in elementary trades roles.

Figure 19 compares the migrant employment share in different roles in the UK economy to each roles' average skill shortage density, and to the proportion of new starters in occupations within those roles paid below the proposed salary thresholds discussed above.[42] Overall, 72 per cent of new starters (those who have been with their employer for two years or fewer) earned a full-time-equivalent salary below the proposed minimum threshold for their occupation. When focusing just on migrants the figure is very similar – 70 per cent. While the proportion comprises a large majority of migrant employment, this indicates that, based upon the jobs they are in, there is no greater concentration of migrants than UK-born employees in jobs that would be classed as too low paid for them to enter the UK in order to take up in a future migration regime.

Nor are migrants significantly more likely than their UK-born counterparts to work in roles that currently suffer from skill shortages (53 per cent of migrants work in above-average skill shortage density roles, compared to 52 per cent of UK born workers). So overall, we find no clear patterns of association between a roles' skill shortage density, its reliance on migrant workers today, and the extent to which its jobs would fall short of proposed salary thresholds in a future migration regime.

Nonetheless, Figure 19 does help us to understand where in the economy skills pressure points associated with the transition to a post-Brexit migration regime may be. We identify eight roles with at- or above-average skill shortage densities and above-average migrant employment shares, in which more than four-fifths of new starters earn below proposed migration salary thresholds.

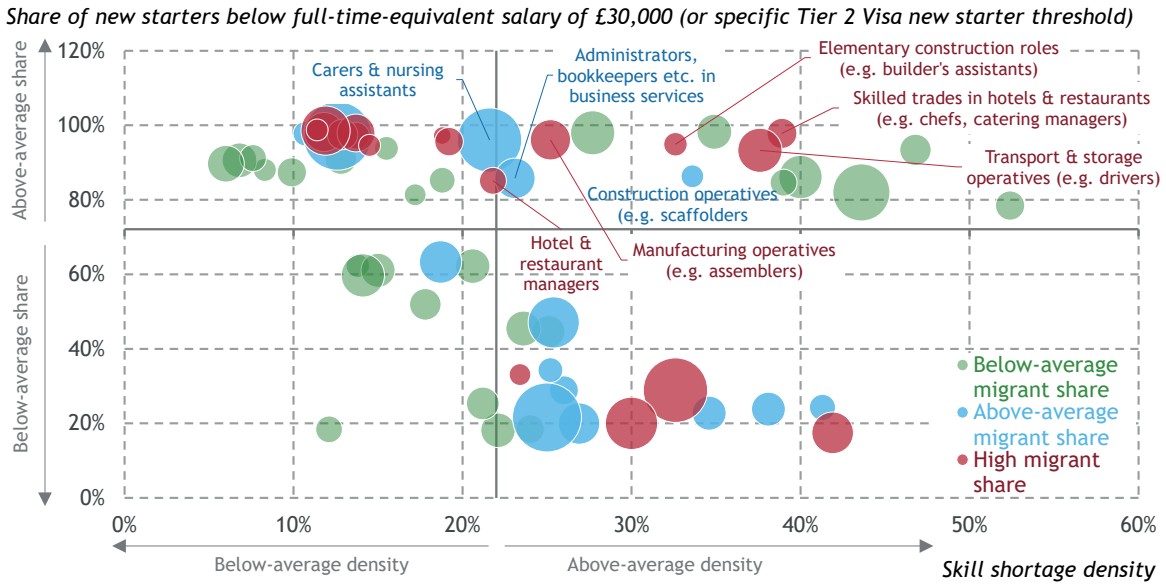
Together, these roles comprise 13 per cent of UK employment. They include: caring and nursing assistants, administrators and bookkeepers, hotel and restaurant managers, construction operatives (e.g. scaffolders), manufacturing operatives (assemblers), elementary construction roles (builder's assistants), skilled trades in hotels and restaurants (chefs and catering managers) and transport and storage operatives (drivers).

More specifically, looking at these roles makes clear that these are generally not parts of the economy that are likely to disappear, significantly shrink or move to much less labour-intensive business models in response to a changing migration regime. With the partial exception of manufacturing operatives and administrators, nor are they in sectors of the economy that might be considered 'tradable', i.e. more easily offshored to other parts of the world. The implication is that, at least over the short- to medium-term, big changes to our migration regime post-Brexit of the kind that have been proposed stand a decent chance of amplifying already existing skill shortages in these parts of the economy.

[42] When specified in the current Tier 2 immigrations rules, salary thresholds are set at the four-digit occupation level. We apply them on this basis to respondents to the *Labour Force Survey*, but for the purposes of this analysis have to aggregate our results within 'roles' (one-digit sectors intersected with one-digit occupations) in order to compare to skill shortages.

Figure 19: A collection of roles are migrant-reliant, pay below proposed immigration salary thresholds and have high skill shortages

Roles by skill shortage density, share of new starters earning below relevant salary threshold, and migrant density: 2016-18



Notes: Roles are defined by combining one-digit SIC and one-digit SOC codes. Roles comprising less than 0.5 per cent of employment are excluded. Bubble size indicates employment share. New starters are those who have been with their employer for less than two years. For those four-digit occupations specified in the Home Office's Immigration Rules code of practice for Tier 2 Sponsors (Appendix J), the salary threshold for new starters is applied; in all other cases, the £30,000 minimum salary threshold proposed by the Migration Advisory Committee is used. Roles with a high migrant share are those in which more than 20 per cent of workers were born outside the UK; above- and below-average migrant share roles are those above and below 14.2 per cent of employment being non-UK-born (the average for the sample used in this analysis, somewhat lower than the average in published labour market statistics of 17.2 per cent).
Source: RF analysis of ONS, *Labour Force Survey*; DfE, *Employer Skills Survey*

Another angle on the scale of potential skills pressures created by changes to the migration regime is the fact that of migrants in employment in the UK today, 1.4 million (26 per cent of all migrants in work) work in roles with above-average skill shortage densities and earn below the proposed salary thresholds for their occupation. Of course, this is not to say that this represents the level of 'missing' skills in future – stocks of migrants in the UK are very different from inflows (which is what the future migration regime will apply to), and employers' requirements for staff change over time. But it does give a sense of the scale of the migration changes being proposed and their relationship to existing employer-reported skill needs in terms of labour supply.

If we want to increase the pace of educational attainment growth in a way that is responsive to the challenges and opportunities created by Brexit as well as to skill shortages already present today, the purpose of the analysis in this section has been to shed light of the parts of the economy and types of skills on which we might focus.

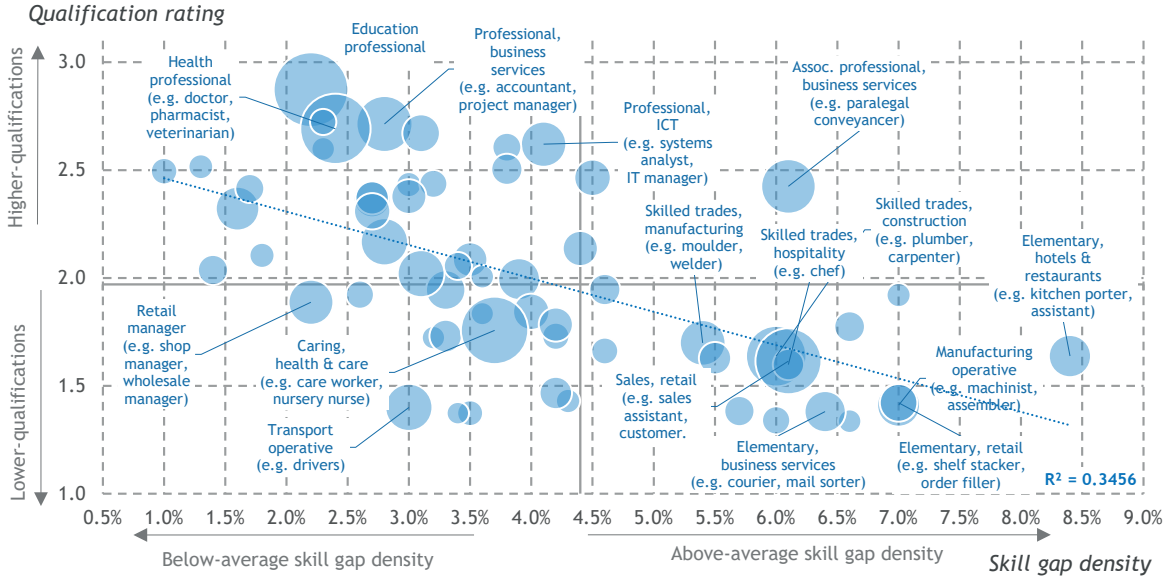
Concerns over skill shortages should not distract employers from investing in their existing staff

Shedding light on *skill shortages* helps to identify the types of roles that would benefit most from an accelerated supply of skilled applicants. Shedding light on skill gaps – where employers complain that their staff lack proficiency – helps to identify where employers could do more to raise skill levels, and by extension productivity, among their existing staff. During 2017, 13 per cent of employers told the *Employer Skill Survey* that they had "at least one member of staff who was not fully proficient." Overall, employers claimed that 1.1 million workers, or 4.4 per cent of UK staff, suffered from a skill gap.[43]

In contrast to skill shortages – which bore no clear association to the types of qualifications held by new starters – there does appear to be a strong correlation between skill gaps and educational attainment: roles in which more than 4.4 per cent of workers are reported to suffer from a skill gap tend to be filled by workers with lower-level qualifications. Figure 20 illustrates this association: for each of the roles outlined earlier in the Section, it plots skill gap density (the proportion of workers within each role whom employers deem to be missing skills) against the average level of attainment held by its 22-64 year old workers.

Figure 20: Roles with above-average levels of skill gaps tend to be filled by workers with mid- and lower-level qualifications

Roles by qualification rating and skill gap density, 22-64 year olds, 2016-18



Notes: Each role is a combination of the ONS one-digit SIC and one-digit SOC. Roles that comprise less than 0.5% of total employment are excluded. Each role's qualification rating is found by applying to each 22-64 year old within that role a score based on their highest qualification held (one referred to GCSE-level or below qualifications; two referred to A level-equivalent and sub-degree higher education; three, degree and higher). The average qualification score is then applied to each role. Source: RF analysis of ONS, *Labour Force Survey* and DfE, *Employer Skills Survey*

[43] There is no significant overlap between roles (occupation by industry combinations) that have an above-average level of skill gaps and roles that have an above-average level of skills shortages. Of the 74 roles with employment share of 0.5 per cent or larger during 2016-18, 30 had an above-average skill shortage density (i.e. above 22 per cent of all vacancies) and 26 had an above-average skill gap density (i.e. more than 4.4 per cent of staff were deemed to have a skill gap. 11 roles featured both above-average skill gaps and above-average skill densities. See Annex 1 for information on skill shortage and skill gap densities within each occupation by industry role.

A quick glance at Figure 20 shows that roles with above-average skill gap levels (i.e. where more than 4.4 per cent of staff are reported to have a skill gap) tend to be filled by workers with lower and mid-level qualifications. For instance, employers complain that nearly 9 per cent of adults working in elementary roles in hotels and restaurants (where the average level of qualification is GCSE-equivalent) have a skill gap.

At the other end of the scale, employers say that only 2.2 per cent of education professionals (a large majority of whom qualifications above Bachelor's degree-level) suffer from a skill gap.Of course, there are outliers: several roles staffed by adults with, on average, lower-level qualifications do not suffer from an above-average level of skill gaps. There are a handful of roles staffed by workers with mid- and higher-qualified individuals that do.

As with skill shortages, we should take reports of skill gaps with a pinch of salt: they could reflect frustrations that stem from working in industries with narrow profit margins, higher-rates of turnover and/or lower-levels of motivation. Moreover, many of the skills that employers report missing could be classed as 'general' more so than 'specialist': on top of basic maths and literacy skills they include, for instance, self-management, time-management and prioritisation of tasks. And yet, by virtue of their reporting skill gaps, employers deem them a problem. In fact, more than half of employers who reported having skill gaps said that these gaps increase workloads for other staff; 27 per cent said gaps resulted in higher operating costs and just over 20 per cent said that skill gaps resulted in a loss of business to competition.[44]

Work-related training is skewed towards already highly qualified staff

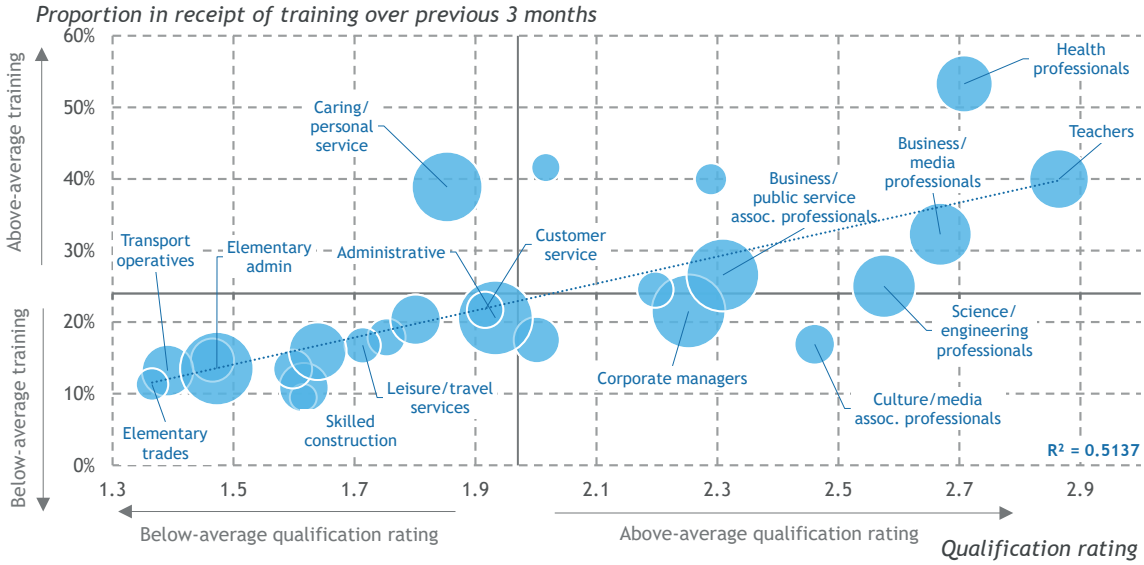
Given the correlation between employers' skills complaints and lower-level qualifications, we could expect firms to direct their training and development efforts towards staff that sit near the bottom of the qualifications distribution. In fact, the opposite pattern holds: lower-qualified adults are both trained at a lower rate than their higher-qualified counterparts, and also trained at a lower rate than lower-qualified adults were in the past.

Figure 21 illustrates the first of these two points: for each two-digit occupation within the ONS's 2010 standard occupational classification system, it charts the proportion of 22-64 year olds in receipt of work-related training over the previous 13 weeks against the average qualification level held by 22-64 year old workers in each occupation. It finds a clear association between qualification levels and training rates: on average, roles with higher-level qualifications offer more frequent training; those with lower-level qualifications offer less. This is surprising: work-related training would, in theory, be able to help employers fill a range a skill gaps – whether these gaps are in technical, specialist or more general competencies.

[44] IFF Research, *Employer skills survey 2017: main report*, Department for Education, August 2018

Figure 21: Adults in occupations that demand higher-level qualifications receive a higher-level of work-related training

Proportion of 22-64 year olds in receipt of work-related training over the previous three months by two-digit occupation and the average level of attainment within each occupation, 2016-18



Notes: Bubble sizes reflect each occupation's share of employment during 2016-18. Colours are used to indicate whether the average qualification level held by 25-28 year olds in each occupation is higher (pink), mid-level (purple) or lower-level (beige). Qualification ratings are derived from assigning a 'score' to each high-level qualification type: Level 6+ (degrees and higher); Levels 3-5 (A level equivalent qualifications and sub-degree HE qualifications) and Level 2 and below (GCSE-equivalent qualifications and lower, including no qualifications).
Source: RF analysis of ONS, *Labour Force Survey*

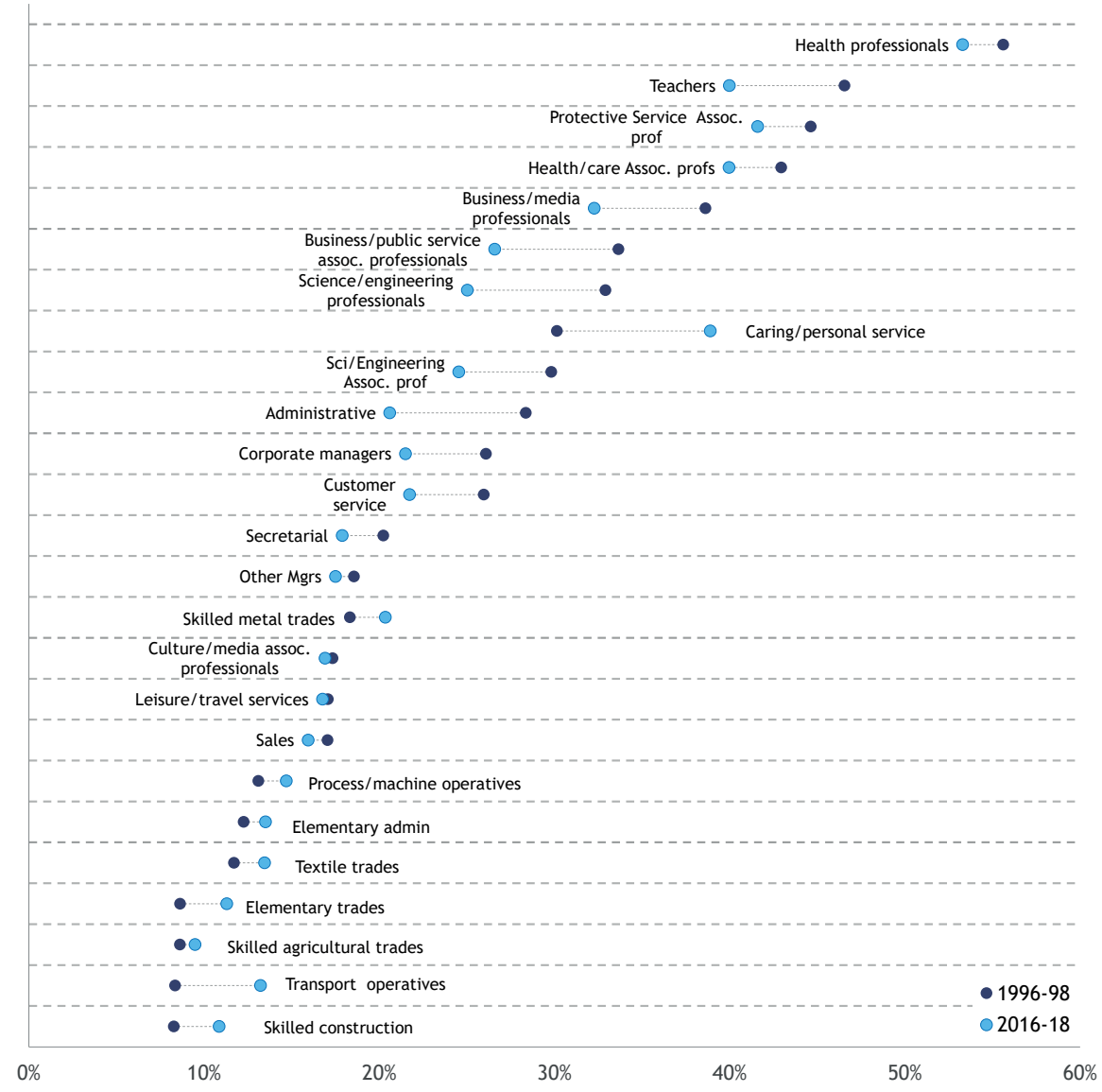
For instance, teaching professionals have on average very high-level qualifications: during 2016-18, well over half (56 per cent) of 22-64 year olds in this category were qualified to Master's level or higher, with an additional 32 per cent having a Bachelor's degree. They also had one of the highest rates of training: while overall, 24 per cent of 22-64 year olds reported having received work-related training during the previous 13 weeks, over 40 per cent of teachers did. Teachers stand in clear contrast to elementary administrative and service workers, which includes jobs such as messengers, cleaners and security guards. This group has a far lower qualification rating: 52 per cent have lower-level or no formal qualifications. They are also trained at a much lower rate: only 14 reported having received work-related training over the previous 13 weeks.

The fact that training rates differ by qualification *across the labour market* does not necessarily imply that training rates differ by qualification *within a given firm* – the data we analyse here does not allow for such a distinction. It could be that firms which recruit, on average, higher-qualified workers are more likely to reinvest in their skills. And indeed, that individuals with higher-level qualifications have demonstrated a preference for advanced (or indeed continual) learning. However, figures from the *Labour Force Survey* do suggest that there are differences in work-related training by qualification level *within* same industry. For instance, in 13 out of 17 of the ONS's single-digit industries, graduates have the highest rate of work-related training.

Of course, the fact that a person has had some recent training tells us little about the depth of skills or capacities that they gained from it: 'training' could refer to an hour-long health and safety briefing just as it could a year-long intensive course. Taking training length into consideration, we find less of an association between the predominant qualifications held by workers in a given occupation and the length of training those workers for receive. Overall, 40 per cent of 22-64 year olds in receipt of training over 2016-18 went on programmes that lasted two weeks or longer, however that figure varies from as little as 32 per cent (transport operatives) to 54 per cent (associate professionals working in culture, media and sport).

Figure 22: Training rates have fallen across most occupations

Percentage point change in proportion of 22-64 year olds in receipt of work-related training over the previous three months

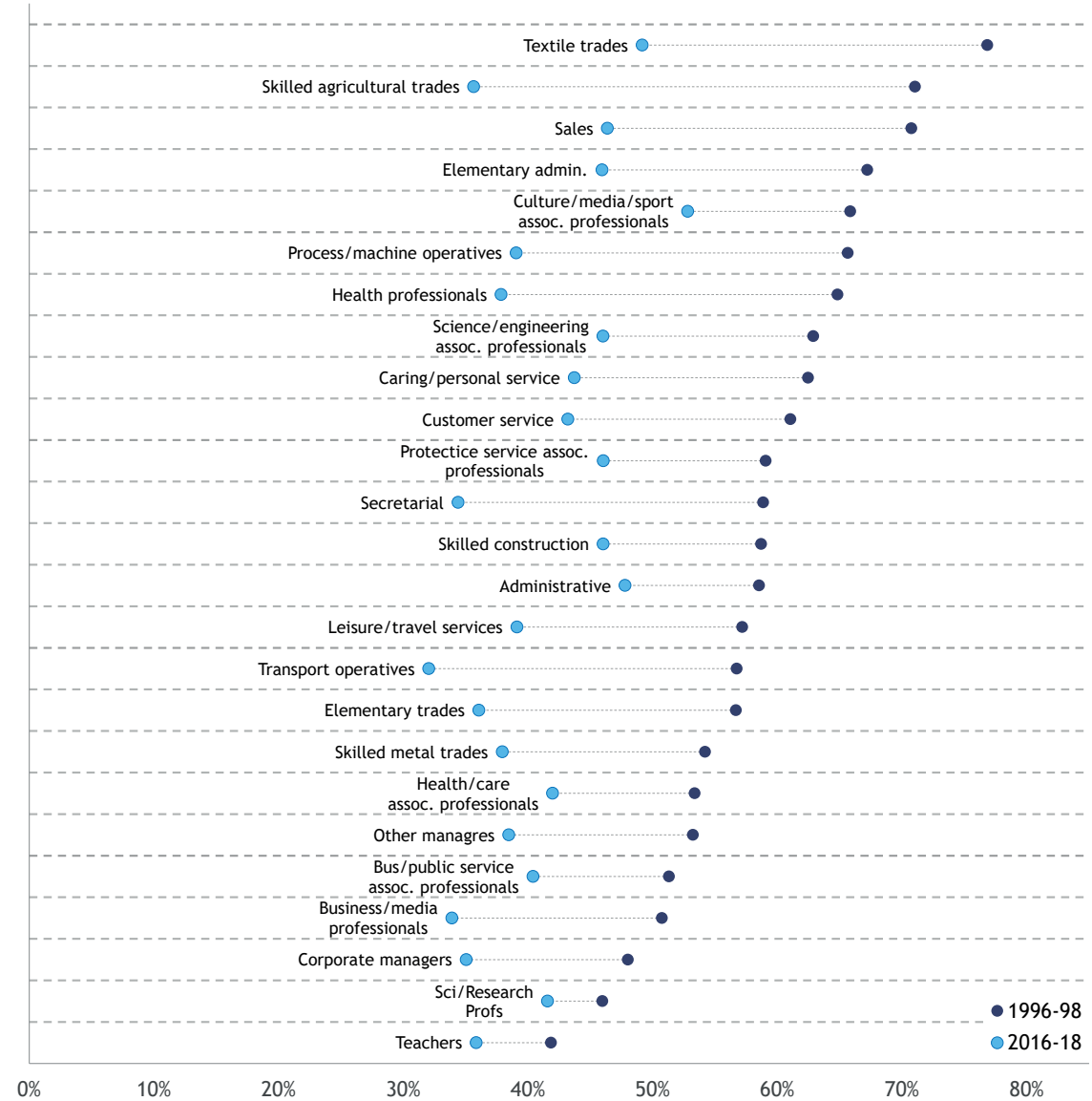


Source: RF analysis of ONS, *Labour Force Survey*

Current patterns in training reflect an unfortunate scenario: the opportunity to receive training is very much skewed towards the 'already-haves,' while the length of any training received tends to vary, with no association to pre-existing education levels. Moreover, this unfortunate scenario is worse for today's workers than it was for their predecessors two decades before. Figure 22 compares the training rates experienced by 22-64 year olds across two-digit occupations between 1996-98 and 2016-18, finding that – in most occupations – the proportion of adults in receipt of recent work-related training fell. Added to the fact that training rates have fallen across most occupations, Figure 23 indicates that the length of training for those lucky enough to be trained at all has fallen across every single two-digit occupation.

Figure 23: The length of training for those trained has fallen across all occupations

Share of 22-64 year olds in receipt of work-related training whose training lasted longer than two weeks, 1996-98 and 2016-18



Source: RF analysis of ONS, *Labour Force Survey*

One implication of these patterns and trends is that employers appear to be compounding their own problems: they offer less training towards lower-qualified staff – the type of workers that they are more likely to complain about.[45]

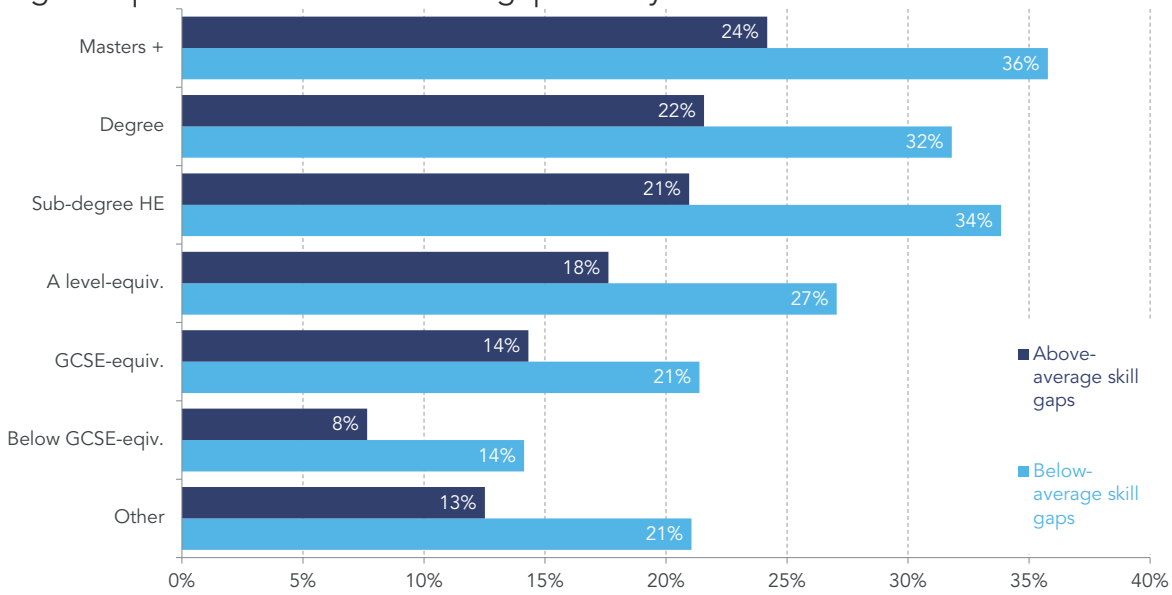
Employers appear to provide less training to those employees whom they say lack necessary skills

The idea that employers' training patterns help to compound their own skills-related complaints becomes clearer when we look at how training rates vary according to skill gap: workers in roles with an above-average level of employer-reported skill gaps receive less frequent training than workers in roles with a below-average level of employer-reported skill gaps. During 2016-18, 29 per cent of 22-64 year olds in roles that have a below-average skill gap density (under 4.4 per cent) reported having received work-related training in the past four months. Only 16 per cent of those in roles with a skill gap density at or in excess of 4.4 per cent did.

Importantly, this association is more than just a reflection of the wider patterns in work-related training discussed above, where workers with higher-level qualifications receive more frequent training than workers with lower-level qualifications. Figure 24 shows that training rates are lower for those working in roles with an above-average skill gap, even after we account for qualifications.

Figure 24: Workers in roles with an above-average skill density receive less frequent training, even after accounting for qualifications

Proportion of 22-64 year olds in receipt of training over the past three months, by highest qualification held and skill gap density: 2016-18



Notes: 'Above-average' refers to roles where skill gap density is 4.4 per cent of workers, or higher.
Source: RF analysis of ONS, *Labour Force Survey* and DfE, Employer Skills Survey

[45] Previous Resolution Foundation analysis analysed changes in training rates and lengths according to birth cohort. it found that reductions in training for younger cohorts, relative to the training experienced by older cohorts at the same age, was driven by a reduction in training within occupations and industries. In other words, training reductions for younger cohorts were not driven by changing occupational/industrial patterns but rather that across occupation and industry firms appear to offer less training today than in the past. See: K Henehan & A Vignoles, *Technical Fault: Options for Promoting Human Capital Growth*, Resolution Foundation, April 2018

Across qualification levels, 22-64 year olds working in above-average skill gap roles have a lower training rate than their counterparts who work in roles with fewer employer-reported skill gaps. For instance, 36 per cent of Master's degree-holders in below-average skill gap roles reported receiving work-related training over the past three months, only 24 per cent of Master's degree-holders in above-average skill gap roles did. At the bottom end of the qualifications scale, the training rate for lower-qualified (below GCSE-level) workers in below-average skill gap roles (14 per cent) is substantially higher than the training rate for experienced by their lower-qualified counterparts working in above-average skill gap roles (8 per cent).

On top of the fact that lower-qualified workers receive less frequent training than their higher-qualified training counterparts, the within-qualification difference in training rates according to skill is are larger for those with lower-level qualifications. Worryingly, these patterns hold when we focus specifically on new starters (those with their employer for less than two years).

Some of these training differences could be tautological: less attractive employers may tend to both train and pay less than their counterparts, and as a result, have reduced recruiting power when compared to their competitors, so are more likely to complain about skill levels of the individuals they manage to recruit. At the other end of the scale, training rates may be higher in roles that staffed by individuals who require license to practice, where continuing professional development could is often mandated.

Regardless of the cause, however, the presence of employer-reported skill gaps does suggest that employers as a whole have room for improvement when it comes to their role as skills suppliers. While skewed and falling rates of training are a worry across the board, the fact that employers offer less training in the sorts of roles that they ascribe skill gaps does suggest they are making things worse for themselves. To that end, policies like the apprenticeships levy – which require employers whose pay bill exceeds £3 million to contribute 0.5% of it into a fund for apprentice training – are theoretically welcome.[46]

Workers in roles that suffer from above-average skill gaps are also paid less

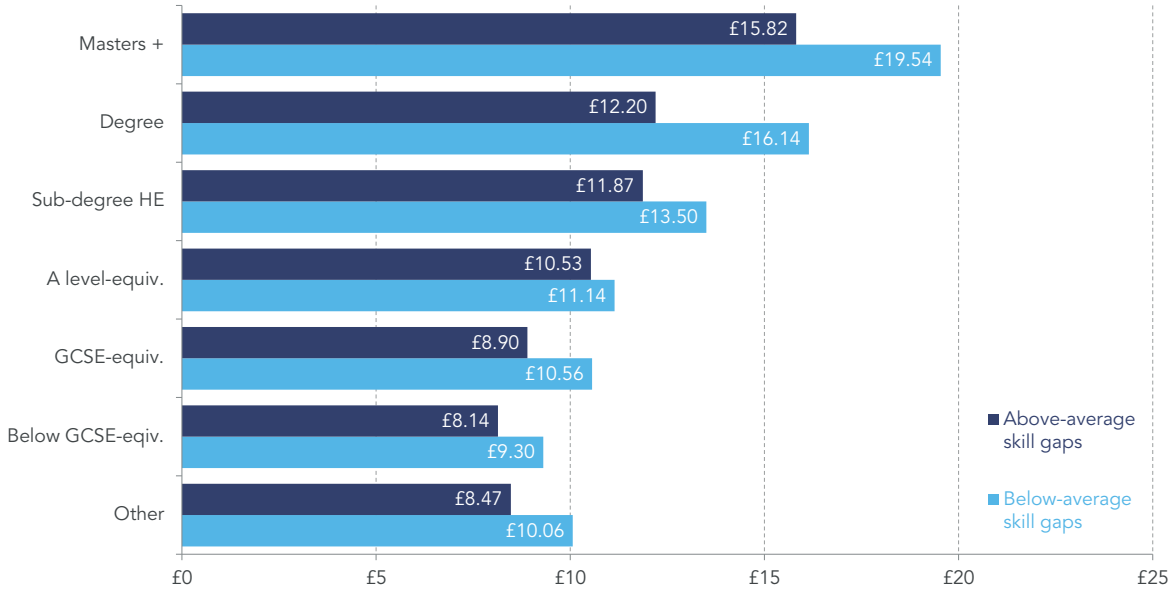
The downsides of working in an above-average skill gap role extend beyond opportunities for training: 22-64 year olds in roles with above-average skill gap levels are paid less than their counterparts working in roles with below-average skill gap levels. And as with training rates, the skill gap-pay pattern persists even when we attempt to compare like-for-like workers. Figure 25 compares median hourly pay by skill gap density and highest qualification held. Whether the average qualification held by a worker is lower (e.g. GCSE

[46] The apprenticeship levy is welcome to the extent that it encourages firms to invest in human capital. There are, however, concerns that as the new apprenticeship funding system develops, the number of opportunities for young people to take on programmes at Levels 2 and 3 has fallen, while the number of opportunities take up by older people at higher levels of study (e.g. Bachelor's and Master's degree-level) has risen. The apprenticeship levy also raises questions about training by firm size: historically, larger firms have offered higher rates of training. The apprenticeship levy, which is mostly paid larger employers, could reinforce that pattern. See: K Henehan, '*Apprenticeships have a starring role in the government's technical education reforms. But are they delivering?*' Resolution Foundation blog, 8 December 2018

A*-C-equivalent and below) or higher (degree and above), individuals in roles with the above-average skill gap density are paid less than counterparts in roles with the smallest level of skill gaps.

Figure 25: Individuals in roles with a below-average skill gap density are paid more, even after accounting for qualifications

Median hourly pay for roles by each role's qualifications base and skill gap level, 22-64 year olds, 2016-18



Notes: 'Above-average' refers to roles where skill gap density is 4.4 per cent of workers, or higher.
Source: RF analysis of ONS, *Labour Force Survey* and DfE, *Employer Skills Survey*

Median hourly pay for degree-level workers in below-average skill gap roles is £19.54 – 32 per cent more than counterparts in above-average skill gap levels (£15.82). Those with GCSE-equivalent education in below-average skill gap roles are paid £10.56 – 18 per cent more than their counterparts in roles with above-average skill gaps (£8.90). Of course, these within-qualification pay differences will likely reflect different occupational outcomes: for instance, graduates who failed to attain a managerial or professional-level role would, in most instances, be paid less than their counterparts who had.

Table 2 attempts to provide some context: it lists the ten roles with the highest skill gap densities, noting for each role average training rates, median hourly pay and qualifications held by 22-64 year olds. These 10 roles wherein at least six per cent of staff are reported to be missing skills, comprised just over 15 per cent of the country's employment. (See Annex 1 for a complete list of skill shortages, gaps, training rates, pay and qualifications within each of the occupation by industry roles.)

Table 2: Roles with ten highest skill gaps rates: example jobs, training rates, pay and qualifications 22-64 year olds, 2016-18

	Example	Skill gap density	Employment share	Training rate	Median hourly pay	Degree-level qualifications	Mid-level qualifications	Lower-level qualifications
Sales & customer service, Business services	Telesales, call centre agents	7.0%	0.6%	20.6%	£10.04	28.3%	36.9%	32.2%
Elementary, Retail & wholesale	Shelf stacker, order picker, trolley assistant	7.0%	1.4%	11.6%	£8.48	10.4%	23.2%	53.7%
Skilled trades, Business services	Maintenance engineer	6.6%	0.9%	11.8%	£12.64	17.8%	50.4%	27.8%
Elementary, Construction	Day labourers, hod carrier, ground worker	6.6%	0.5%	13.4%	£10.17	4.0%	24.6%	55.5%
Elementary, Business services	Office cleaner, mail sorter	6.4%	1.7%	9.4%	£8.36	9.7%	20.4%	54.6%
Skilled trades, Hotels & restaurants	Chef, catering/bar manager	6.1%	1.0%	13.9%	£9.22	10.4%	36.8%	37.5%
Sales & customer service, Retail & wholesale	Sales assistant; retail cashiers	6.1%	4.3%	15.7%	£8.51	14.6%	31.3%	49.4%
Skilled trades, Construction	Carpenter, plasterer, plumber	6.0%	3.6%	11.3%	£12.67	5.7%	59.1%	28.8%
Elementary, Manufacturing	Packer, factory cleaner	6.0%	0.8%	10.6%	£9.11	5.5%	22.2%	54.4%
Operative, Retail & wholesale	Process worker (textile), routine inspector	5.7%	0.9%	12.4%	£9.44	7.3%	24.6%	50.7%
Skilled trades, Retail & wholesale	Mechanic, product maintenance	5.5%	1.0%	14.5%	£10.71	4.5%	53.3%	34.5%
Skilled trades, Manufacturing	Manufacturing/ production engineer	5.4%	2.0%	16.3%	£12.61	6.0%	54.1%	33.1%
Associate professional, Manufacturing	Manufacturing engineer, mechanical technician, production controller	5.3%	1.4%	22.2%	£17.69	39.7%	38.8%	18.6%

Notes: Roles that comprise less than 0.5% of total employment are excluded.
Source: RF analysis of ONS, *Labour Force Survey* and DfE, *Employer Skills Survey*

In most cases, a majority of workers in these roles have mid- or lower-level qualifications, are paid below the median hourly figure for 2017 (£12.01) and have a lower training rate than the average worker (24 per cent trained in the previous three months).

Put together, the link between skill gaps, training rates and pay warrants reflection: lower-qualified adults are trained less than higher-qualified adults to begin with; those lower-qualified adults who are unlucky enough to work in roles with above-average skill gap levels are trained even less than their lower-qualified counterparts in below-average skill gap roles. This inequality risks prolonging, if not entrenching, disadvantage: without training, lower-skilled individuals in lower-paid/higher-skill gap roles have less opportunity to develop the skills and capabilities that would help them to improve their living standards by moving up, or moving, out of their role.

Employers face skills challenges on two fronts but they do have agency on at least one

Employers face challenges in their role as skill 'demanders.' While a review of skill shortages helps to shed light on areas where employers currently face recruitment difficulties, a preview of roles most likely affected by reduced migration highlights areas where employers may face even more substantial short-to medium-term recruitment challenges. Employers can try to address demand-side concerns: for instance, they can communicate to educators where shortages exist, they can engage with the education system including by sponsoring apprentices in roles beset by shortages, and they can express migration-related concerns to government. However, these methods are in some cases slow moving and an in others without a guaranteed outcome.

But while employers have a natural role to play as 'demanders' of qualifications and skills, they play a role on the supply side as well. Only here, they have more (direct) agency: the presence of skill gaps, and in particular their concentration towards the lower end of the qualifications distribution, highlights areas where employer-led training would be most welcome. And yet, our analysis finds that training is offered less routinely in roles where employers are more likely to complain about skills, even after accounting for qualifications. Training rates have fallen for most occupations while training length has fallen for all. Although much of the responsibility for picking up the pace of educational attainment lies with the formal education system, the country's human capital base would benefit from a boost in employer-led education and training as well.

Section 5

Conclusion

The fortunes of a nation's economy rest upon its people. Decades of progress in productivity, pay and purchasing power have been driven in part by a rapid rise in the nation's human capital stock. But that engine of growth is spluttering: progress in boosting the share of young people with mid-and higher-level qualifications, as well as reducing the share with lower-level qualifications has roughly halved since the early 2000s.

Brexit adds a complicating factor: while it could serve as a prompt for action - adding urgency to the much-needed acceleration in educational attainment – it will inevitably prove disruptive. Firms may struggle to struggle to recruit in the short- to medium term, which has knock-on effects for labour costs and in some cases profits. It's clear that, whatever the consequences of Brexit, focus needs to revert towards re-energising the UK's supply of human capital.

Skill shortages and skill gaps provide one means of viewing shortcomings in the scale and composition of qualifications. While we should refrain from over-interpreting the causes of both of these, the skills shortage analysis makes clear the broad range of occupations that could benefit from a boost to qualifications supply – from engineering technicians to chefs. The skill gap analysis highlights roles where the capacities of existing staff are lacking, pointing the need to address at least some of these through improved levels of work-related training.

Both skill shortages and skill gaps highlight the need for a plurality of approach, including for firms to rediscover their own investment in staff. The centrality of human capital to productivity and living standards will not rise or fall dependent on the outcome of Brexit; now is the time to reboot its growth.

Annex 1

Employment characteristics by industry/occupation

	Employment share, 22-64 year-olds, 2016-18	Skill gap density, 2017	Skill shortage density, 2017	Qualification rating, 22-64 year olds, 2016-18	Qualification rating, 25-28 year old new starters, 2016-18	Share born outside UK, 22-64 year olds, 2016-18	Trained over past 13 weeks, 22-64 year olds, 2016-18	Ppt change in trained over past 13 weeks, 22-64 year olds, 2016-18 from 2009-11	Trained over past 13 weeks, 25-28 year olds, 2016-18	Ppt change in trained over past 13 weeks, 25-28 year olds, 2016-18 from 2009-11	Median hourly pay, 22-64 year-olds, 2016-18	% Change in median hourly pay, 22-64 year-olds, 2009-11 to 2016-18	Annualised median pay (2016-18), 22-64
Mgr, Manufacturing	1.2%	4.4%	21.2%	2.1	2.2	12.2%	16.6%	-1.8%	20.5%	-7.4%	£20.73	2.5%	£42,000
Mgr, Construction	0.9%	1.4%	24.0%	2.0	2.2	12.8%	19.1%	0.5%	35.9%	11.3%	£19.99	-1.2%	£40,900
Mgr, Retail	2.0%	2.2%	18.7%	1.9	2.5	17.2%	13.0%	-1.1%	18.8%	-3.9%	£12.80	-3.2%	£25,600
Mrg, Hotels & Restaurants	0.8%	2.6%	21.8%	1.9	2.2	25.1%	12.2%	-2.8%	16.0%	-2.6%	£9.61	-2.4%	£19,100
Mgr, ICT	0.6%	1.3%	-	2.5	2.5	19.6%	16.3%	-2.7%	27.2%	16.8%	£25.69	6.5%	£52,200
Mgr, Fin. Services	0.7%	1.0%	-	2.5	2.3	24.1%	31.1%	2.3%	45.0%	10.5%	£28.51	4.4%	£58,200
Mgs, Bus. Services	1.9%	1.6%	26.9%	2.3	2.6	16.0%	18.5%	-2.6%	29.2%	1.1%	£22.25	4.5%	£44,900
Mgr, Public admin	0.6%	3.0%	-	2.4	2.2	9.7%	35.2%	-3.9%	50.5%	3.8%	£21.48	-7.7%	£43,200
Mgr, Health & Care	0.8%	1.7%	12.1%	2.4	2.8	14.2%	37.8%	-7.3%	32.2%	-21.7%	£17.50	-9.4%	£35,400
Mgr, Arts & other services	0.6%	1.8%	13.8%	2.1	2.4	13.7%	17.8%	-2.9%	17.0%	-11.9%	£13.58	-3.4%	£27,500
Prof, Manufacturing	1.3%	4.5%	38.1%	2.5	2.9	16.5%	26.3%	1.4%	29.8%	1.1%	£19.27	-1.1%	£38,800
Prof, Construction	0.8%	3.2%	41.3%	2.4	2.8	16.7%	28.5%	2.2%	37.1%	1.8%	£19.65	-0.2%	£39,100
Prof, Retail	0.5%	2.3%	23.4%	2.6	2.7	21.1%	28.3%	-5.9%	29.3%	-6.1%	£17.85	-12.0%	£35,200
Prof, ICT	2.0%	4.1%	41.9%	2.6	2.8	27.0%	20.5%	-0.6%	18.8%	-7.5%	£21.63	-2.4%	£43,800
Prof, Fin. Services	0.8%	3.8%	-	2.6	2.9	29.7%	28.5%	-2.1%	29.3%	-12.4%	£28.06	6.9%	£56,900
Prof, Bus. Services	3.1%	2.8%	30.0%	2.7	2.9	22.4%	31.1%	-2.4%	33.8%	-8.4%	£19.79	-4.3%	£40,100
Prof, Public Admin	1.4%	3.1%	22.1%	2.7	3.0	12.9%	37.8%	-3.0%	36.6%	-6.8%	£19.29	-1.0%	£39,200
Prof, Education	5.5%	2.2%	25.0%	2.9	2.9	14.7%	39.5%	-5.7%	39.2%	-11.0%	£18.24	-8.4%	£37,100

Prof, Health & Care	4.9%	2.4%	32.6%	2.7	2.9	22.6%	52.3%	-4.6%	50.0%	-10.0%	£16.61	-5.0%	£33,700
Prof, Arts & other services	0.7%	2.3%	25.2%	2.7	3.0	17.6%	30.2%	-2.3%	30.7%	-9.8%	£15.31	-1.5%	£30,900
Assoc Prof, Manufacturing	1.4%	5.3%	23.6%	2.2	2.3	13.9%	22.2%	-1.4%	23.9%	-6.1%	£15.81	-2.7%	£31,600
Assoc Prof, Retail	1.2%	3.5%	25.1%	2.1	2.3	14.6%	20.6%	0.7%	22.8%	-1.6%	£13.48	-1.7%	£26,600
Assoc Prof, ICT	1.0%	3.8%	26.0%	2.5	2.6	18.4%	17.3%	-2.6%	18.5%	-1.8%	£17.75	-2.9%	£35,700
Assoc Prof, Fin. Services	1.3%	2.7%	34.6%	2.4	2.6	18.8%	29.7%	-1.6%	32.0%	-4.8%	£19.66	0.3%	£39,400
Assoc Prof, Bus. Services	2.9%	6.1%	25.4%	2.4	2.7	18.3%	22.7%	-1.9%	29.0%	-0.1%	£14.67	-5.9%	£29,400
Assoc Prof, Public Admin	2.2%	2.8%	14.1%	2.2	2.6	8.9%	38.5%	-4.4%	42.4%	-5.4%	£15.39	-5.0%	£31,100
Assoc Prof, Education	1.1%	2.7%	17.8%	2.4	2.8	10.8%	32.8%	-3.8%	31.4%	-7.3%	£12.97	-5.8%	£25,800
Assoc Prof, Health & Care	1.3%	2.7%	15.0%	2.3	2.5	11.7%	39.4%	-5.3%	33.7%	-11.4%	£12.71	-6.0%	£25,700
Assoc Prof, Arts & other services	1.2%	3.0%	20.6%	2.4	2.6	15.2%	21.5%	-1.3%	20.6%	-4.3%	£12.55	-5.3%	£24,400
Admin, Manufacturing	0.7%	4.2%	18.8%	1.7	2.0	12.9%	15.2%	-0.3%	19.1%	-2.3%	£10.98	-3.4%	£21,800
Admin, Construction	0.5%	3.2%	17.2%	1.7	1.9	12.3%	11.7%	-3.1%	20.2%	-1.9%	£11.36	2.7%	£22,800
Admin, Retail	1.0%	3.3%	12.8%	1.7	1.9	13.4%	14.5%	0.9%	16.7%	-0.8%	£9.39	0.2%	£18,700
Admin, Fin. Services	0.9%	4.6%	9.9%	1.9	2.6	12.9%	23.1%	-1.6%	27.8%	-2.1%	£11.49	-1.2%	£23,100
Admin, Bus. Services	1.7%	3.9%	23.1%	2.0	2.5	16.6%	18.7%	-0.3%	25.5%	-1.9%	£11.23	-1.3%	£22,200
Admin, Public Admin	1.5%	3.3%	6.0%	1.9	2.3	8.8%	24.2%	-1.6%	27.4%	-1.2%	£11.41	-0.5%	£23,000
Admin, Education	0.8%	3.4%	7.6%	2.1	2.7	9.9%	24.3%	-1.4%	23.1%	-12.3%	£10.36	-0.3%	£20,700
Admin, Health & Care	1.3%	4.0%	6.8%	1.8	2.7	10.6%	25.5%	-0.7%	26.3%	-6.5%	£9.80	-5.2%	£19,800
Admin, Arts & Other Services	0.5%	3.6%	8.3%	2.0	2.4	11.5%	18.6%	-2.2%	25.1%	-4.8%	£9.84	-3.0%	£19,400
Skilled trades, Primary Sector	0.7%	4.6%	39.0%	1.7	2.0	5.2%	19.1%	2.7%	29.3%	10.8%	£12.59	-3.5%	£24,500
Skilled trades, Manufacturing	2.0%	5.4%	40.0%	1.7	1.6	13.8%	16.3%	1.9%	20.9%	5.8%	£11.92	0.3%	£23,700
Skilled trades, Construction	3.6%	6.0%	43.6%	1.6	1.7	14.9%	11.3%	-0.9%	13.6%	-2.2%	£12.48	-1.0%	£24,300
Skilled trades, Retail	1.0%	5.5%	46.8%	1.6	1.8	14.7%	14.5%	1.0%	17.3%	0.9%	£10.28	-1.7%	£19,900
Skilled trades, Hotels & Restaurants	1.0%	6.1%	38.9%	1.6	1.6	42.5%	13.9%	0.3%	17.6%	4.9%	£8.53	3.0%	£17,000

Skilled trades, Bus. Services	0.9%	6.6%	52.4%	1.8	2.6	10.8%	11.8%	-0.8%	11.8%	-5.7%	£11.76	3.4%	£23,100
Caring, Leisure & Services, Bus. Services	0.5%	3.6%	14.5%	1.8	2.2	21.8%	25.3%	0.1%	29.7%	3.7%	£9.35	1.0%	£18,800
Caring, Leisure & Services, Education	2.2%	3.1%	27.7%	2.0	2.3	11.5%	36.8%	-3.1%	39.1%	-3.1%	£8.32	-4.8%	£16,700
Caring, Leisure & Services, Health & Care	4.5%	3.7%	21.6%	1.8	1.8	20.6%	41.0%	-1.0%	38.8%	-4.0%	£8.55	-2.8%	£17,100
Caring, Leisure & Services, Arts & Other Services	1.1%	4.2%	34.9%	1.8	1.8	14.8%	14.9%	-2.1%	16.4%	0.2%	£8.28	-1.0%	£15,700
Sales, Retail	4.3%	6.1%	12.6%	1.6	1.9	17.2%	15.7%	-0.5%	17.4%	-2.5%	£7.92	5.7%	£15,700
Sales, Bus. Services	0.6%	7.0%	15.5%	1.9	2.1	12.3%	20.6%	-1.6%	26.2%	3.7%	£9.19	-2.7%	£18,100
Operative, Manufacturing	1.8%	7.0%	25.2%	1.4	1.4	29.6%	13.7%	-0.7%	16.4%	-1.3%	£9.62	-0.8%	£19,400
Operative, Construction	0.6%	4.3%	33.6%	1.4	1.4	18.3%	15.1%	-1.4%	10.8%	-9.9%	£11.42	-4.1%	£23,000
Operative, Retail	0.9%	5.7%	19.2%	1.4	1.8	22.3%	12.4%	1.3%	10.8%	0.2%	£8.57	-3.4%	£17,200
Operative, Transport	2.2%	3.0%	37.6%	1.4	1.7	29.6%	13.0%	-2.1%	17.0%	1.9%	£10.67	0.1%	£21,500
Elementary, Manufacturing	0.8%	6.0%	13.7%	1.3	1.3	35.3%	10.6%	0.0%	16.0%	2.1%	£8.43	1.4%	£17,000
Elementary, Construction	0.5%	6.6%	32.6%	1.3	1.2	23.2%	13.4%	1.0%	15.1%	-5.1%	£9.86	2.5%	£18,900
Elementary, Retail	1.4%	7.0%	13.7%	1.4	1.5	30.1%	11.6%	0.6%	12.4%	2.1%	£8.06	2.7%	£16,000
Elementary, Hotels & Restaurants	1.8%	8.4%	11.9%	1.6	1.9	34.6%	14.8%	-0.1%	15.4%	-3.3%	£7.45	7.6%	£14,200
Elementary, Transport	1.0%	4.2%	12.9%	1.5	1.5	30.4%	12.5%	1.8%	14.4%	3.5%	£10.04	-1.3%	£20,200
Elementary, Bus. Services	1.7%	6.4%	11.8%	1.4	1.6	35.3%	9.4%	-1.3%	14.6%	1.0%	£7.78	3.7%	£15,700
Elementary, Education	0.7%	3.5%	10.7%	1.4	1.6	17.1%	16.6%	2.6%	17.7%	1.0%	£7.40	4.3%	£15,000
Elementary, Health & Care	0.5%	3.4%	11.4%	1.4	1.8	23.0%	21.0%	0.0%	29.4%	-4.9%	£8.01	1.5%	£16,100

Notes: Qualification ratings are derived from assigning a 'score' to each high-level qualification type: Level 6+ (degrees and higher); Levels 3-5 (A level equivalent qualifications and sub-degree HE qualifications) and Level 2 and below (GCSE A*-C-equivalent qualifications and lower, including no qualifications).

Annex 2

Educational attainment and outcomes among 25-28 year-olds

	Masters+	Bachelor's Degree	Level 4/5 vocational	Level 4/5 academic	Level 3 vocational	Level 3 academic (e.g. A level)	Level 2 vocational	Level 2 academic (e.g. GCSE A*-C)	Below Level 2	No qualifications	Other qualifications
Share of 25-28 year olds in 2016-18	11.1%	29.3%	3.8%	3.0%	14.0%	8.9%	6.0%	11.0%	3.3%	5.0%	4.7%
Ppt change in share of 25-28 year olds, 1996-98 to 2016-18	7.4%	15.4%	-3.1%	1.6%	-0.1%	1.2%	1.4%	-11.5%	-6.0%	-5.0%	-1.2%
Share of 25-28 year-olds w/main wage-earning parent in managerial, professional or associate	70.6%	56.3%	41.3%	38.0%	35.4%	43.5%	25.9%	30.8%	17.3%	19.2%	23.3%
Share of 25-28 year olds employed, 2016-18	88.2%	90.2%	88.7%	78.2%	86.8%	84.4%	75.7%	75.8%	61.1%	48.6%	74.3%
Ppt change in share of 25-28 year olds employed, 1996-98 to 2016-18	0.6%	1.2%	-2.6%	-6.3%	1.7%	3.0%	-0.3%	-1.7%	-6.6%	2.8%	9.1%
Share of 25-28 year olds in high-skilled (managerial, professional, associate	82.7%	65.2%	42.0%	36.6%	21.3%	36.4%	12.5%	19.6%	12.2%	9.8%	11.9%
Ppt change in share of 25-28 year olds with high-skilled job 1996-98 to 2016-18	-4.1%	-9.9%	-18.7%	-12.7%	0.9%	-3.1%	-6.4%	-2.6%	0.5%	2.1%	-12.0%
Share of 25-28 year olds in mid-skilled (skilled trades or administrative) job, 2016-18	7.5%	14.8%	25.4%	19.6%	35.3%	26.1%	27.4%	25.9%	22.7%	19.8%	22.4%
Ppt change in share of 25-28 year olds in mid-skilled job, 1996-98 to 2016-18	-0.7%	-1.4%	1.2%	-9.3%	-14.4%	-9.1%	-8.7%	-10.4%	-6.2%	-4.4%	-0.7%
Share of 25-28 year olds in service (caring and sales) job, 2016-18	7.1%	13.6%	23.3%	24.0%	29.9%	23.3%	33.1%	26.8%	30.1%	18.2%	13.9%
Ppt change in share of 25-28 year olds in service job, 1996-98 to 2016-18	3.7%	7.8%	14.2%	9.9%	17.4%	8.6%	12.1%	8.1%	10.2%	3.1%	1.2%
Share of 25-28 year olds in process/elementary role, 2016-18	2.7%	6.4%	9.3%	19.8%	13.5%	14.2%	26.9%	27.7%	35.0%	52.3%	51.8%
Ppt change in share of 25-28 year olds in process/elementary job,	1.0%	3.5%	3.3%	12.1%	-3.8%	3.6%	2.9%	4.9%	-4.6%	-0.9%	11.6%
Share of 25-28 year-olds trained during previous 13 weeks, 2016-18	34.2%	29.3%	29.1%	27.3%	25.6%	23.7%	23.5%	18.7%	15.0%	9.1%	21.4%
Ppt change in share of 25-28 year-olds trained during previous 13 weeks,	-15.4%	-16.4%	-12.2%	-10.7%	1.6%	-11.2%	-2.8%	-5.1%	-3.1%	0.2%	-0.7%
Share of trained 25-28 year-olds whose training was less than 2 weeks, 2016-18	44.9%	41.3%	35.6%	31.9%	44.3%	28.5%	41.1%	34.9%	43.3%	24.9%	43.3%
Ppt change in share of trained 25-28 year-olds with training lasting less than 2 weeks	11.5%	7.7%	8.2%	2.2%	20.0%	5.0%	5.9%	2.4%	17.7%	4.3%	21.0%
Median hourly pay (CPIH), 25-28 year olds, 2016-2018	£14.34	£12.30	£10.61	£9.67	£9.60	£10.19	£8.55	£8.77	£8.73	£7.73	£8.34
Median annualised pay (CPIH), 25-28 year olds, 2016-2018	£28,046	£24,054	£20,738	£18,903	£18,771	£19,925	£16,718	£17,151	£17,073	£15,108	£16,304
% Change in median hourly pay, 1996-98 to 2016-18, 25-28	9.5%	-3.1%	-3.9%	-7.4%	7.8%	5.1%	9.5%	4.7%	17.9%	20.3%	3.8%

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