

205
Working Paper
December 2020

Technological change and
precarity: how technology is
changing the UK's low skill
labour market and a search
for policy responses

By Steffan Willis



DPU Working Papers are downloadable at: [www.ucl.ac.uk/bartlett/development/DPU Working Papers](http://www.ucl.ac.uk/bartlett/development/DPU%20Working%20Papers) provide an outlet for researchers and professionals working in the fields of development, environment, urban and regional development, and planning. They report on work in progress, with the aim to disseminate ideas and initiate discussion. Comments and correspondence are welcomed by authors and should be sent to them, c/o The Editor, DPU Working Papers.

Copyright of a DPU Working Paper lies with the author and there are no restrictions on it being published elsewhere in any version or form. DPU Working Papers are refereed by DPU academic staff and/or DPU Associates before selection for publication. Texts should be submitted to the DPU Working Papers' Editor Étienne von Bertrab.

Design and layout: Ottavia Pasta

Technological change and precarity: how technology is changing the UK's low skill labour market and a search for policy responses

By Steffan Willis

Abstract

Author

Steffan Willis

Supervisor

Dr. Robinson Rojas Sandford

MSc Urban Economic Development

Development Planning Unit,
University College London

2nd September 2019 /
reviewed for DPU working paper
30th November 2020

Technological change is having significant impacts on the UK's labour market and low skill workers in particular. This paper constructs a framework linking the capabilities of technologies to changes in the occupational structure of the labour market, arguing that technologies which substitute for low skill labour weaken the bargaining position of workers relative to employers. The framework draws upon two hitherto distinct bodies of work namely, that of a labour economics literature on skills-biased technological change and the literature around precarious employment which links labour market flexibility to individual labour market outcomes. This framework is used to analyse the impact of technological change on low skill workers through the lens of precarious employment. The paper adopts a two-stage analytical approach. Using data from the Labour Force Survey the paper finds evidence of increasing levels of precarious employment amongst low skill workers. This is combined with a qualitative assessment of the current labour market policy concluding that workers possessing basic levels of education and skills no longer command sufficient bargaining power to ensure high wages and secure employment and that existing government policies do little to enable low skill workers impacted by technological change to develop the skills needed to be competitive in the contemporary labour market. The paper concludes with a discussion of potential policy responses.

Content

01

05 Introduction

02

07 Literature review and theoretical framework

- 07 Technological change and labour market
- 09 Labour market flexibility

03

11 Framework

- 11 Low skilled workers
- 12 Analytical framework

04

14 Methodology

05

15 The low skill labour market

- 15 Technology-driven structural change
- 19 Precarious employment
- 22 Precarious employment in the non-graduate labour market

06

25 Current labour market policies

- 25 National living wage
- 27 Education, training and skills

07

29 Policy options

- 30 Minimum wage and universal basic income
- 31 Employees, workers and the self-employed
- 31 Adult skills policy

08

34 Conclusion

There's never been a better time to be a worker with special skills or the right education... there's never been a worse time to be a worker with only 'ordinary' skills and abilities to offer.

01. Introduction

Prophecies of impending automation-induced unemployment are widespread. In 2012 an oft miscited study by Frey & Osborne caused headlines after they found that 47% of jobs in the US were at high risk of automation. Whilst often hyperbolic, these fears are not without some merit. There have been impressive advances in artificial intelligence and robotics in recent years, enabling an ever-growing number of tasks to be performed by machines and there have been significant falls in certain 'at risk' occupations. History demonstrates that fears of new technologies displacing workers have been a consistent feature of technological change, stretching back to the Luddite revolts of the early 19th century. However, the increase in productive capacity enabled by rapid technological development during the industrial revolution created many more jobs than it displaced¹. Is this time different? When taken at a macro-level, there is no clear evidence to suggest that it is - the ratio of employment to population rose between 2005 and to 2019, adding 3.3m jobs to the UK economy and unemployment is at record lows.

NOTE 01

Although, significantly for the contemporary debate, the conditions in the factories and mills of the period were considerably worse those of the small-scale hand artisans that they displaced. Source: [Engels, 1845](#).

However, whilst the total number of jobs seems unlikely to fall, the type of jobs will almost certainly change significantly over the medium to long term. These shifts in the occupational structure of the labour market will depend on whether workers possess skills which are either augmented by, or substituted for, technology. Quoting Brynjolfsson & McAfee (pg. 11, 2014) in *The Second Machine Age*:

"there's never been a better time to be a worker with special skills or the right education...there's never been a worse time to be a worker with only 'ordinary' skills and abilities to offer"

This paper is about the 'ordinary' worker. What impact is technological change having on the employment outcomes of low skilled workers in the UK labour market and what policy responses are needed to ameliorate the most pernicious effects? Drawing upon theories of technological change developed by labour economists, this paper constructs a framework linking the capabilities of technologies to changes in the occupational structure of the labour market, arguing that technologies which substitute for low skill labour weaken the bargaining position of workers relative to employers. Having made this link, the impact on low skill workers is analysed through the lens of precarious employment defined as low income, low quality, low security employment.

Framed within the current policy context this paper asks, what impact is technological change having on the incidence of precarious employment amongst low skilled workers in the UK labour market and what policy responses are needed to ameliorate the most pernicious effects?

Section 2 begins with a thorough review of the relevant literature, aiming to draw out and critique the main theoretical concepts which then inform the conceptual and analytical framework described in section 3. The research process followed a two-step process. Section 5 provides descriptive analysis of the key trends impacting low skill workers, finding evidence of increasing incidence of precarious employment amongst this population. This is coupled with a qualitative assessment of the current labour market policy context in section 6. The conclusion, which feeds into the policy recommendations outlined in section 7, is that workers possessing basic levels of education and skills no longer command sufficient bargaining power to ensure high wages and secure employment and that existing government policies do little to enable low skill workers impacted by technological change to develop the skills needed to thrive in the contemporary labour market. The policy responses fall into two categories: those which tackle the issues of low income and lack of security associated with precarious employment and those designed to equip workers with skills augmented by technology.

Framed within the current policy context this paper asks, what impact is technological change having on the incidence of precarious employment amongst low skilled workers in the UK labour market and what policy responses are needed to ameliorate the most pernicious effects?



FIGURE 1.1

Neil Schofield (2019). Gig Economy. Licensed under creative commons (CC BY-NC 2.0). Available [here](#).

Technological change increases the demand for higher level skills. If demand outpaces supply, then the wages of highly skilled workers will rise relative to lower skilled workers.

02. Literature review and theoretical framework

This section provides a thorough review and critique of two distinct but interrelated bodies of literature, namely a labour economics literature focused on the impact of technological change on labour markets and a literature which links labour market flexibility with individuals' labour market outcomes. The theories underpinning these literatures are drawn out and evaluated and then summarised into a conceptual and analytical framework in Section 3.

2.1 Technological change and labour markets

How has technological change impacted labour markets? This question has been the subject of academic debate amongst, primarily US-focused, classical labour economists since the 1970s. Tinbergen (1974), looking to explain widening income inequality, proposed a model of supply and demand for skills, arguing that technological change increases the demand for higher level skills. If demand outpaces supply, then the wages of highly skilled workers will rise relative to lower skilled workers.

This insight formed the basis of the skill-biased technological change (SBTC) hypothesis that was developed by, amongst others, Katz & Murphy (1992), Katz (1999) and Card & Lemieux (2001). The SBTC model assumes two distinct categories of labour, high and low skill, which are imperfect substitutes. The size of the high skill wage premium is determined by the relative supply and demand for these skills and the authors present extensive empirical evidence for the phenomena in the US in the 1970s and 1980s. During the 1980s the growth in the supply of high-skilled workers fell relative to the growth in demand causing the wage premium to rise, in turn leading to rising income inequality.

This debate drew the link between technological change, the demand for high skill workers and relative wages. However, during the 1990s, two phenomena were observed in the US labour market, job polarisation and falling real wages of low-skilled workers, which the SBTC model was unable to accommodate. There are two primary critiques: firstly, the model fails to distinguish between skills and tasks, meaning that the model is unable to explain changes in the occupational structure of the labour market. Secondly, because technology is seen as factor augmenting, the model struggles to deal with the rapid adoption of new technologies that substitute capital for labour, which tend to reduce real wages for those impacted (Acemoglu & Autor, 2011).

During the 1990s, two phenomena were observed in the US labour market, job polarisation and falling real wages of low-skilled workers.

Addressing these issues, Autor et al. (2003) propose a task-based approach, later formalised in Acemoglu and Autor (2011). The model is based on the observation that technological change, in the form of industrial automation and computerisation, substitutes for a range of specific tasks, generally routine manual and cognitive, whilst simultaneously complementing workers performing non-routine tasks, such as complex calculations, problem solving and communication. This implies that computerisation will change the occupational structure of the labour market by eliminating jobs with high levels of routine tasks. This claim is supported by Autor & Dorn (2013), who find that during the 1990s, the share of service occupations increased from 12.9 to 19.8 percent of total work hours for non-college educated workers, in contrast to declining employment in all other less educated occupations. They hypothesise that the core tasks associated with service workers are neither complemented nor replaced by computerisation.

Computerisation will change the occupational structure of the labour market by eliminating jobs with high levels of routine tasks.

The task-based model predicts that, as the cost of computing capital falls, industries with a large amount of routine labour will invest in computerisation. Highly educated workers are more likely to be complemented by technology and so the relative demand for these workers will increase, whilst demand for those performing routine tasks, which the authors argue are frequently medium-skilled, will fall. This matches the empirical evidence from the 1990s and 2000s in the United States (Autor, et al., 2003; Acemoglu & Autor, 2011), which shows that the number of medium-skill jobs and the wages of medium-skill workers declined. The extent to which high-skill wages change relative to low-skill wages depends on whether middle-skill workers move into more or less skilled employment.

Goos and Manning (2003), drawing on Autor et al. (2003), show that the UK labour market between 1975 and 1999 also corresponded to this pattern of job polarisation, seeing rising numbers of both high and low-skill jobs and a decline in the number of medium-skill, routine jobs such as manufacturing (manual) and clerical (cognitive) work. Rising levels of over-qualification amongst workers in low-skill jobs suggests that the displaced middle found work in less-skilled employment. Furthermore, they argue that amongst low skill occupations, skill requirements are falling as more complex tasks are automated. This places downward pressure on the real wages of low skill occupations.

The strength of the task-based model is its adaptability to changes in the capabilities of technology. Recent studies (Frey & Osborne, 2013; Arntz & Zierahn, 2016; ONS, 2018) have suggested that, in contrast to polarisation seen in the 1990s and early 2000s, new technologies increasingly substitute for less skilled workers, which the model readily accommodates. Furthermore, it is flexible enough to cover an extremely broad view of technological change, encompassing the impact of offshoring production to developing economies, enabled by the fall in transport and communication costs facilitating complex global production networks (Acemoglu & Autor, 2011). Finally, by drawing the link between the relative cost of technological capital and labour and the investment decisions of firms, it provides a conceptual framework for analysing the future path of automation given changes in relative costs.

However, whilst the model has significant analytic power, empirical evidence does not adequately incorporate other potential drivers for the relative returns to education and skills, including increases to the minimum wage and policies which promote labour market 'flexibility'. For example, the observed increase in low-skill wages during the late 1990s in the United States, which Autor & Dorn (2013) argue is driven by an increase in relative demand for low-skilled service occupations, corresponds to historically low unemployment rates and increases in the minimum wage in 1996 (Mishel et al., 2013).

7.4% of workers in England are at high risk of automation.

One major offshoot from this literature is concerned with the likely future impact of automation on the labour market. As mentioned in the introduction, a widely cited study estimates that 47% of US jobs are at high risk of automation, of which the vast majority are low skilled occupations such as sales, services, office and administrative support, as well as remaining manufacturing / production roles (Frey & Osborne, 2013). Other studies are more cautious - the ONS (2016) estimates that 7.4% of workers in England are at high risk of automation and Arntz & Zierahn (2016) find that 9% of jobs in OECD countries are at risk, although all agree that low skilled occupations are likely to be most heavily impacted. There are, however, significant methodological challenges with all these studies as they rely heavily on assumptions about the future course of technological progress, the cost of technological capital relative to labour and the direction of government regulation. Much of the variation in estimates comes from differences in threshold specification and whether tasks or occupations are considered.

Whilst these forecasts should be interpreted with extreme caution, they highlight a core debate between those such as Autor (2015), writing from a classical perspective, who believe that, over the long-run, the impact of automation will be welfare-enhancing and that the economy will generate new jobs to replace those that are lost, and those who adopt a more dystopian view, such as Ford (2015), who argue that the exponential increase in computing power and advances in artificial intelligence and robotics foreshadow widespread technology-induced unemployment. Neither position provides a fully convincing argument. Autor (2015) acknowledges that automation will have large negative impacts on specific industries in which capital is readily substituted for labour, however, he argues that this will be more than offset by rising productivity in industries augmented by technology which in turn raises wages, and demand for goods and services. Medium-skill workers will find employment in novel occupations and the service sector will expand to accommodate low-skill workers. Unfortunately, the claim that new jobs will be created does not appear to be borne out in the recent empirical literature. Acemoglu & Restrepo (2017), who analysed the impact of industrial robots on employment in local labour markets, found that the adoption of one additional robot reduced local employment by 6.2 jobs. More importantly, by taking a narrow view of the overall quantity of jobs, he fails to consider the impact of technology on the quality of low-skill employment and income inequality. Meanwhile, the dystopian (Ford, 2015), and indeed the utopian (Bastani, 2019) view of widespread automation, fail to fully consider both the practical and political-economy challenges of realising the visions they articulate.

2.2 Labour market flexibility

One of the key failings of the mainstream labour economics field is the lack of focus on government policy in shaping specific outcomes for low wage workers, given the changes in occupational structure driven by technological change. This gap is filled by a primarily British literature on socio-economic policy and labour market outcomes, which articulates the challenges facing low skill workers, namely the growth of precarious employment, ascribing this to the implementation of policies which promote labour market flexibility.

In his seminal text, Standing (2012) describes the emergence of a new social class, the Precariat, which he defines in relation to the nature and characteristics of their employment opportunities. The Precariat suffers from low, unstable incomes, lacks job security, guaranteed hours and in-work benefits such as holiday and sick pay. The quality of employment is typically poor, with workers lacking a sense of agency or purpose, with few opportunities to gain new skills and progress into better paid positions. The overarching condition is one of permanent insecurity and short-termism, fuelled by weak social relationships with employers and the state. Standing contrasts this position with the Salarariat, who enjoy generous salaries, stable employment, and a variety of in-work benefits, and the traditional working class which, despite low incomes, enjoyed secure employment in recognisable occupations but has been shrinking in size since the 1980s.

One of the main challenges to using the concept of the Precariat is the difficulty in creating operational definitions and measurements. For example, whilst temporary work may be an indicator of precarity, a highly remunerated,

The Precariat suffers from low, unstable incomes, lacks job security, guaranteed hours and in-work benefits such as holiday and sick pay.

freelance IT consultant should not be considered a member of the Precariat. Similarly, low pay, in and of itself, is not a sign of precarity as this may cover students or other young people who have low earnings but high long-term earning potential and are not meaningfully insecure. With these caveats in hand, Standing suggests that around a quarter of the UK population are members of the Precariat to varying degrees. Other estimates range from 15% (Savage et al., 2013) to 35% (Bailey, 2016).

In contrast to Standing's relatively narrow definition of precarity, as relating primarily to labour market outcomes, other authors such as Savage et al. (2013), Lewis et al. (2015) and Collier (2019) adopt a broader definition, including social dimensions such as household formation and cultural capital. Whilst these provide a richer description of the socio-economic condition of a significant section of the population, they further complicate the definition and therefore this paper will utilise a restricted description of precarity to refer to low-wage, insecure employment in poor quality jobs, referred to as precarious employment.

This is similar to the approach of Bailey (2016) who, using the term 'exclusionary employment', aimed to quantify the scale of precarity in the UK. The paper focused on the impact of employment on resources, participation and quality of life, which he proxies as whether an individual received low pay², has experienced a period of unemployment in the past 5 years and a combined measure of quality including low satisfaction, poor physical work environment and low levels of control or flexibility. The findings of the paper again highlight the difficulty in constructing operational measures. Whilst 35% of the labour force meet at least one criteria (largely low income), only 8% were excluded on two or more suggesting either that these factors are unrelated or, more likely, that the choice of measures was inadequate to capture the complexity of the concept. A particular issue appears to be the use of dichotomous variables which reduced the ability to infer nuance in the data set. An interesting secondary result of the study was the finding that higher levels of exclusionary employment (or precarity) are strongly associated with no, or negative, career progression.

Unlike the labour economics literature, Standing (2012), Bailey (2016), Clark & Collings (2018) and Lewis et al. (2015), amongst others, argue that the cause of rising precarity is government policies which promote, or at least facilitate, labour market flexibility. This is not necessarily to discount the role of structural forces such as technological change, for example, Standing (2012) argues that the rise of China and India has reduced the bargaining power of low skilled workers in the developed world by greatly increasing the supply of low and unskilled labour. However, labour market policies are what mediate these exogenous shocks to produce specific outcomes.

A major critique of this literature is its lack of specificity in relation to policies and their impacts. The purported policy outcomes are described in generalities such as reducing employment protections and job security, the decline of unions and collective bargaining agreements or enabling non-standard contractual arrangements. Section 7 attempts to address this gap by analysing the current policy context in order to develop a series of specific policy recommendations aimed at reducing the prevalence of precarious employment.

NOTE 02

The ILO definition of low pay is two-thirds median income. It should be noted that, whilst this definition enables cross-country comparisons and provides some sense of relative inequality, it is essentially arbitrary and does not take into account the cost of essential goods and services, making it a poor guide to absolute poverty.

The cause of rising precarity is government policies which promote, or at least facilitate, labour market flexibility.

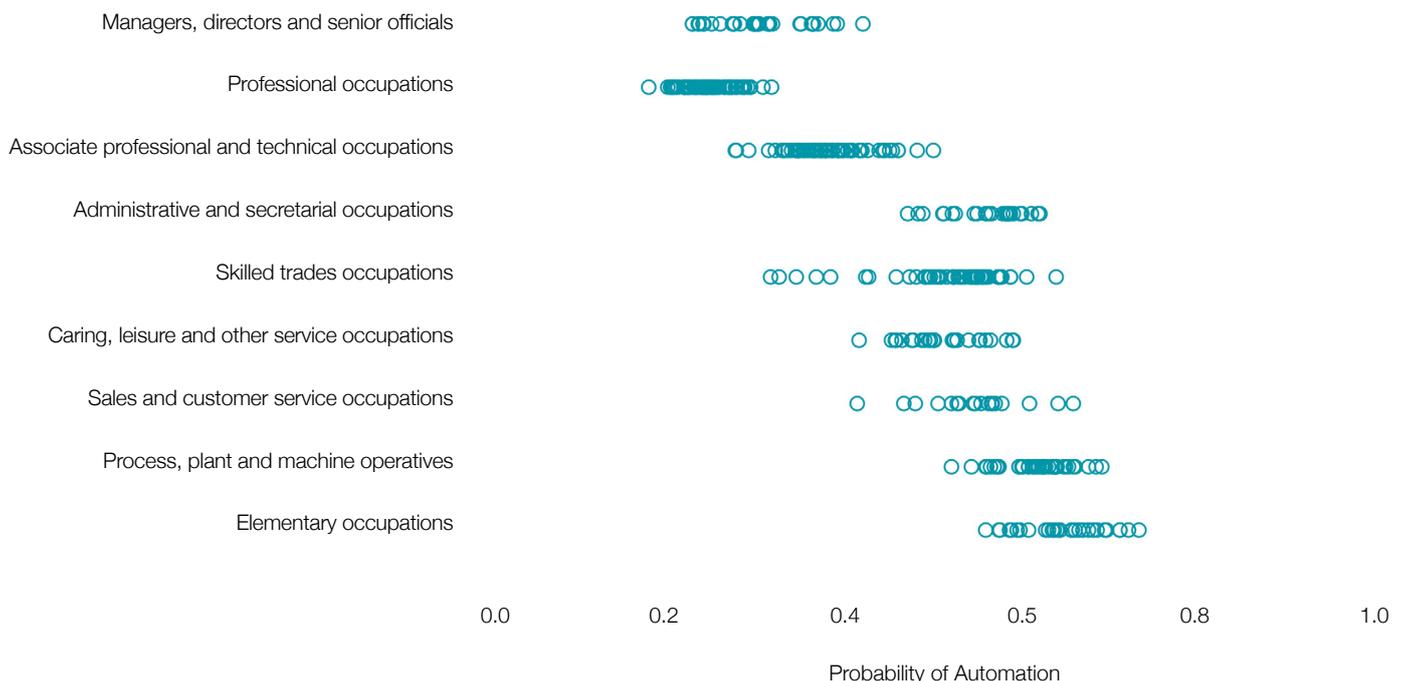
For the purposes of this report, low skilled workers are conceptually defined as those workers likely to be negatively impacted by technological change due to a lack of technology-augmenting skills.

03. Framework

3.1 Low skilled workers

Throughout the literature there are multiple definitions of a low skilled worker. The SBTC literature sets up a dichotomy between low and high skill on the basis of whether an individual has completed a graduate level qualification. Whilst this may not be the most appropriate proxy for whether an individual is likely to be negatively impacted by technological change, it has the great advantage of being easy to measure. Furthermore, as the literature shows, there are considerable differences in terms of employment outcomes between graduates and non-graduates.

FIGURE 3.1
Probability of automation by occupational category.
Source: Author's calculations based on [ONS, 2018d](#)



The task-based model of Acemoglu & Autor (2011) uses occupational categories to define the skill level of high, medium and low skilled workers. This approach is similar to that used by the ONS (2018) in their SOC2010 guidelines, which link occupations to the typical level of qualifications and training required to perform those roles. Low skill occupations generally require the skills gained from a good general education and may require some level of work experience or work-related training. The main advantage of this approach is that it is more closely linked to whether a worker is likely to be at risk as a result of technological change. Figure 3.1 shows the probability of an occupation being automated in the UK (ONS, 2018d), split by occupational category - low skill workers are on average 27.5 percentage points more likely to face automation than workers in high skill occupations. Medium skill workers face similar risks to low skill workers.

For the purposes of this report, low skilled workers are conceptually defined as those workers likely to be negatively impacted by technological change due to a lack of technology-augmenting skills - this definition explicitly covers both low and medium skilled workers (as defined by occupational category). The corollary of this is that high skill is defined as having skills which are augmented by technology. Unfortunately, in operationalising the definition, data constraints mean that both the qualification-based and occupational-based definitions are used in the descriptive quantitative analysis presented in Section 5.

3.2 Analytical framework

The framework draws heavily on the task-based model described in Acemoglu & Autor (2011), in which computing and robotic technologies substitute for specific tasks, generally the routine tasks performed by workers in medium and low skilled occupations (low skill workers). In contrast, technology augments and complements higher skilled workers, enabling them to become more productive - the essential insight of the skill-biased technological change (SBTC) model discussed in Section 2.1. Together these forces drive changes to the occupational structure of the labour market. In parallel, technological change enables new business models and modes of organisation and production to be developed, which leads to changes in the industrial structure of the labour market.³

NOTE 03

In conceptualising technological change, I take an expansive view encompassing everything from the 'gig economy' (enabled by the proliferation of smartphones) and the expansion of online retail (enabled by the development of advanced logistics systems), to the expansion of global production networks. For instance, the Indian software and business process outsourcing sector would not be possible without the dramatic falls in transport and communication costs since the 1980s. In each instance, technological change altered the labour-capital allocation decisions of firms.

This weakens the bargaining position of low skill workers relative to potential employers, as the cost of technological capital essentially limits the ability of workers to demand improvements in pay or job security. A foundational assumption is that competitive firms look to minimise unit production costs - if wages or other factors contributing to total labour costs rise, then firms have a greater incentive to invest in automation technologies. Consequently, technological change is likely to result in low or negligible wage growth, reductions in job security and a deterioration in job quality for low skill workers (Rubery & Wilkinson, 1994).

On the basis that that the cost of computing and robotic capital continues to fall, an ever greater number of firms will find that unit production costs can be minimised by substituting capital for labour. Consequently, without intervention, the bargaining position, and thus labour market outcomes, for impacted workers are likely to continue to deteriorate and incidence of precarious employment will rise.

In contrast, workers with skills which are augmented by technology (high skill) are relatively scarce, thus this group has the ability to demand higher pay and better working conditions. The result is widening income inequality, but also inequality in employment rights, protections and benefits, job quality and labour market security (Green et al., 2015). There is common ground here with Standing's (2011) conception of the Salarariat and Precariat.

In the context of a labour market in which the interests of firms and low skill workers are misaligned, public policy and regulation mitigating the negative effects of technological change are necessary. Un-

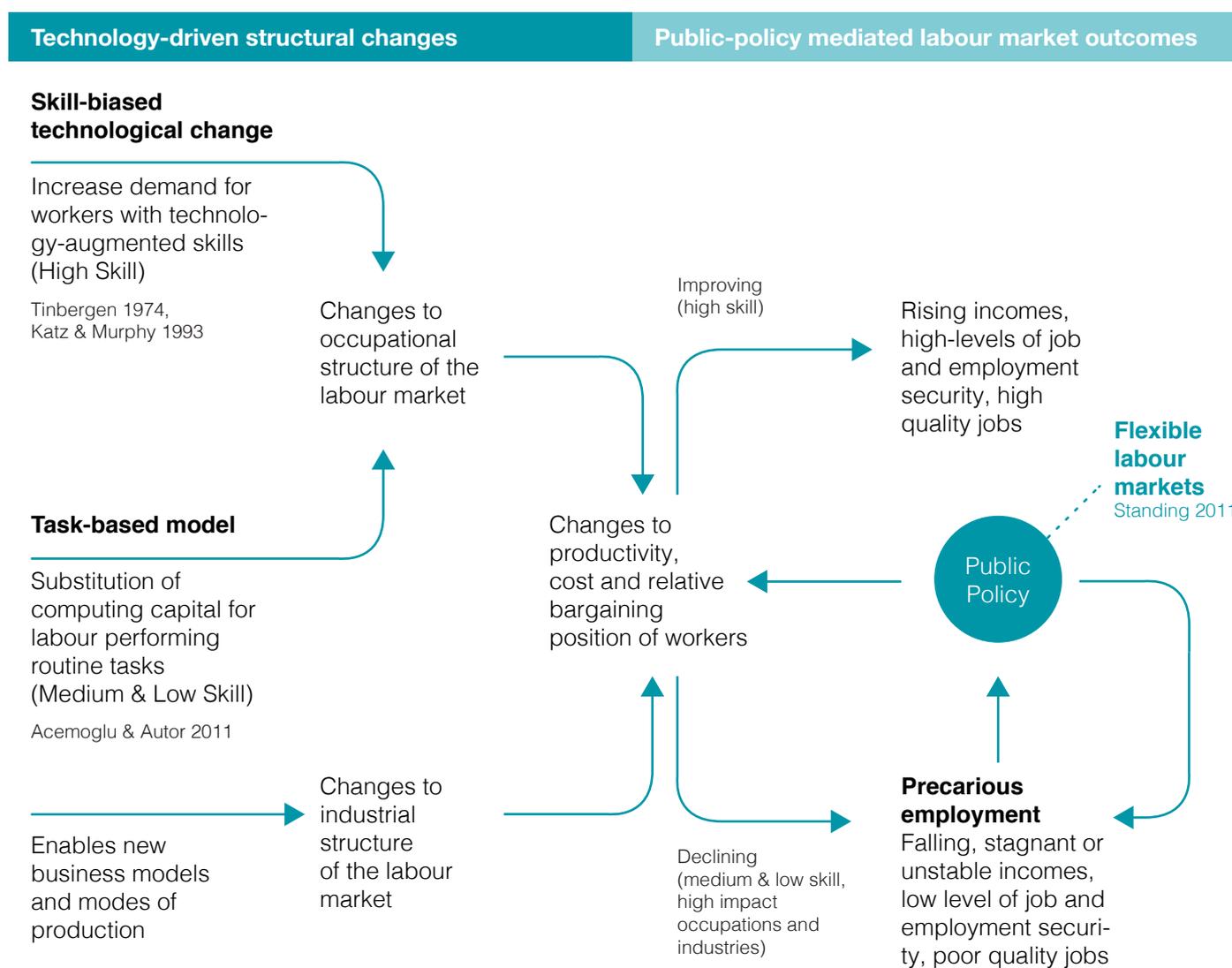
fortunately, in many cases public policy has a negative effect, further reducing the bargaining position of workers. For example, incentive reinforcement policies such as imposing sanctions and rigid eligibility criteria on benefits claimants incentivise accepting low quality employment rather than investments in human capital and skill formation (Bonoli, 2010).

Policy responses can be broadly categorised under income and welfare support, policies which either promote or hinder labour market flexibility, and education, training and skills. The first directly affects the cost of labour and so policies such as the minimum wage or extension of employment rights need to be considered with reference to their impact on firm behaviour. In contrast, education, training and skills policy should enable workers with redundant skills, or working in impacted industries or occupations, to retrain and develop skills and capabilities which are either augmented by technology or at low risk of automation, such as socio-emotional skills or those involving high levels of manual dexterity.

FIGURE 3.2

Analytical framework.

Source: Author.



Researching precarious employment poses a number of challenges, not least the lack of operational metrics and granular data covering measures of income, job quality and employment security.

04. Methodology

To understand the nature of precarious employment in the UK labour market I adopt an interpretive methodology that seeks to combine a quantitative, descriptive analysis of the key trends impacting low skill workers with a qualitative assessment of the policy context in which the labour market operates (Bhattacharjee, 2012). Section 5 provides a descriptive analysis of the structural changes that have occurred in the labour market - I draw upon a variety of official statistics published by the Office of National Statistics which enable the key trends to be identified. However, in order to isolate the nature and extent of precarious employment amongst low skill labour, I use the April-June 2018 Labour Force Survey (LFS) as this enables more granular analysis.

Researching precarious employment poses a number of challenges, not least the lack of operational metrics and granular data covering measures of income, job quality and employment security. These challenges informed the decision to adopt a descriptive analysis in which multiple potential indicators are analysed within the analytical framework outlined in Section 3.3. A further challenge, discussed in detail in section 3.1, is creating an operational definition of 'low skill'. Two alternatives based on classifying occupations and qualifications are used in the quantitative analysis.

The policy context outlined in Section 6 aims to provide a rational description of a number of selected policies which are relevant to determining the labour market outcomes of low skilled workers. Whilst every effort is made to perform a dispassionate, objective analysis of the policies' strengths and weaknesses in relation to the challenges posed by technological change, policy by its very nature contains values embedded within it (Robert & Zeckhauser, 2011). Therefore, it is important to recognise that implicit in the analysis, and certainly in the policy recommendations outlined in Section 7, are the author's own set of values which hold that inequality in wealth, income and opportunity are central issues which need to be addressed through public policy and that there is a role for active government intervention in this area.

Employment rates are significantly higher amongst those with degree-level qualifications - 74% are in employment compared to 51% of those with GCSE-level qualifications.

05. The low skill labour market

This section begins by providing a descriptive analysis of the low skill, low wage labour market. Section 5.1 then analyses the skill and occupational composition of the labour market over time, finding evidence to support the argument that occupations more exposed to technological substitution have declined relative to those that are less exposed. As discussed in section 4, the primary challenge facing researchers in studying precarious employment is the availability of data and the lack of operational metrics, however, Section 5.2 does present a variety of indicators related to insecurity, job quality and income. Whilst many of the trends presented do not, in and of themselves, constitute clear, convincing evidence for the hypothesis that precarious employment is increasing, they do suggest that precarity is concentrated amongst workers in low skill occupations. Section 5.3 aims to quantify the scale of precarious employment by measuring the concurrent incidence of multiple indicators amongst non-graduate workers.

The UK labour force in Q1 2019 was 33.94m people with a participation rate of 64%. Having reached a peak of 8.4% in 2011, the unemployment rate has since fallen consistently - in January - March 2019 it was just 3.9%, a level last seen in 1974. Whilst non-graduate unemployment is also low by historical standards, at 4.8% it remains higher than the average (ONS, 2019a). Those with lower levels of qualification have a significantly lower participation rate – those with degree-level qualifications had a participation rate of 74% compared to just 51% for GCSE-level qualifications. Furthermore, median wages show a graduate ‘skills’ premium of approximately 41% (ONS,2019b).

5.1 Technology-driven structural change

An oft repeated claim in the literature is that the automation of tasks performed by medium and low skilled workers, coupled with skills-biased technological change augmenting high skill workers, will drive structural changes to the occupational and industrial structure of the economy. Goos and Manning (2003), examining the period between 1975 and 1999, found that the economy lost middle skilled jobs whilst gaining both high and low skill jobs, consistent with the polarisation hypothesis.

Two-Digit Standard Occupational Classification (SOC2010)	Total employment			Share of total employment		
	2004 (m)	2018 (m)	Delta (%)	2004 (%)	2018 (%)	Delta (%)
1 Managers, Directors And Senior Officials	2.76	3.50	26.8%	9.7%	10.8%	+1.2
2 'Professional Occupations'	4.82	6.74	39.8%	17.0%	20.9%	+3.9
3 'Associate Professional And Technical Occupations'	3.70	4.75	28.4%	13.0%	14.7%	+1.7
High skill sub-total	11.28	14.99	32.8%	39.8%	46.6%	+6.7
41 Administrative occupations	2.7	2.56	-5.1%	9.5%	8.0%	-1.6
42 Secretarial and related occupations	1	0.66	-33.3%	3.5%	2.1%	-1.5
51 Skilled agricultural and related trades	0.31	0.36	18.6%	1.1%	1.1%	+0.0
52 Skilled metal, electrical and electronic trades	1.27	1.17	-8.0%	4.5%	3.6%	-0.9
53 Skilled construction and building trades	1.16	1.09	-5.7%	4.1%	3.4%	-0.7
54 Textiles, printing and other skilled trades	0.68	0.66	-3.6%	2.4%	2.0%	-0.4
Medium skill sub-total	7.11	6.51	-8.5%	25.1%	20.2%	-4.9
61 Caring personal service occupations	1.67	2.27	35.4%	5.9%	7.0%	+1.1
62 Leisure, travel and related personal service occupations	0.54	0.66	21.8%	1.9%	2.0%	+0.1
71 Sales occupations	1.87	1.76	-5.6%	6.6%	5.5%	-1.1
72 Customer service occupations	0.53	0.64	22.0%	1.9%	2.0%	+0.1
81 Process, plant and machine operatives	1.05	0.83	-20.8%	3.7%	2.6%	-1.1
82 Transport and mobile machine drivers and operatives	1.1	1.21	10.2%	3.9%	3.8%	-0.1
91 Elementary trades and related occupations	0.51	0.51	-1.6%	1.8%	1.6%	-0.2
92 Elementary administration and service occupations	2.64	2.81	6.3%	9.3%	8.7%	-0.6
Low skill sub-total	9.91	10.69	7.8%	35.0%	33.2%	-1.8
Total	28.30	32.18				

FIGURE 5.1

Change in occupational structure of the UK labour market, 2004 - 2018. Note: High skill occupations consolidated into 1-digit SOC categories.

Source: Author's calculations using Annual Population Survey accessed via NOMIS ([ONS, 2018a](#)).

The weakening of the polarisation effect since 1999 (Goos & Manning, 2003) suggests that technological change is increasingly impacting low as well as medium skill occupations.

For the period between 2004 and 2018, figure 5.1 shows the change in the relative share of employment by occupation. High-skill occupations added over 3.7m jobs during the period, whilst the number of middle skill jobs declined 8.5%, representing a fall of 5 percentage points in relative share, driven by significant falls in administrative and secretarial work. The pattern of employment in low skill occupations varied, with manual occupations such as process, plant and machine operatives declining, whilst service occupations increased, in line with observations of Autor & Dorn (2013). It should be noted that this aggregate view masks variation across regions - notably London saw significant increases in low skilled service occupations netting out falls in other regions.

A slightly different picture emerges from figure 5.2 which shows the change in the ratio of high, medium and low skilled occupations by industry between 2004 and 2018. Supporting the SBTC argument, high-skill occupations rose across all industries in both relative and absolute terms (+30.9%). Evidence for the polarisation hypothesis is weaker - whilst the share of medium-skill jobs declined by 5 percentage points and 9% in absolute terms this was coupled with a 2 percentage point fall in the share of low skilled occupations, although the absolute number did increase by 6.6%. The weakening of the polarisation effect since 1999 (Goos & Manning, 2003) suggests that technological change is increasingly impacting low as well as medium skill occupations

One of the most striking changes in the UK labour market since 2004 has been the decline in administrative and secretarial occupations, down 468,000, and the increase in the number employed in caring personal services, up 593,000. Both sectors have large female workforces, 75% and 83% respectively, often working part-time. The reduction in administrative and secretarial work is likely an example of the impact of computing technology both substituting for labour of secretaries and simultaneously augmenting managers by enabling them to efficiently manage their work via online tools. In contrast, the work performed by care workers is an example of a service sector relatively untouched by technology (ONS, 2018a).

Wages in the caring personal services sector are extremely low – at £269 per week, they are 20% lower than in administrative and secretarial occupations (ONS, 2019c). The quality of work also appears to be poor, with the turnover rate in 2017-18 amongst care workers at 38% per annum (p. 57, Care Quality Commission, 2017). In addition, rates of self-employment and other forms of flexibility are significantly higher in the care sector than in administrative and secretarial occupations (ONS, 2018a). This suggests that as middle-skill employment declines, those that are unable to transition into high skill occupations are likely to find that they are pushed into precarious employment defined as low income, poor quality and insecure. This appears to be a particular issue for low skilled female workers.

As middle-skill employment declines, those that are unable to transition into high skill occupations are likely to find that they are pushed into precarious employment.

FIGURE 5.2

Change in skill-content of employment by industry, 2004 - 2018. Note: Skill-content based on occupational categories defined in SOC2010.

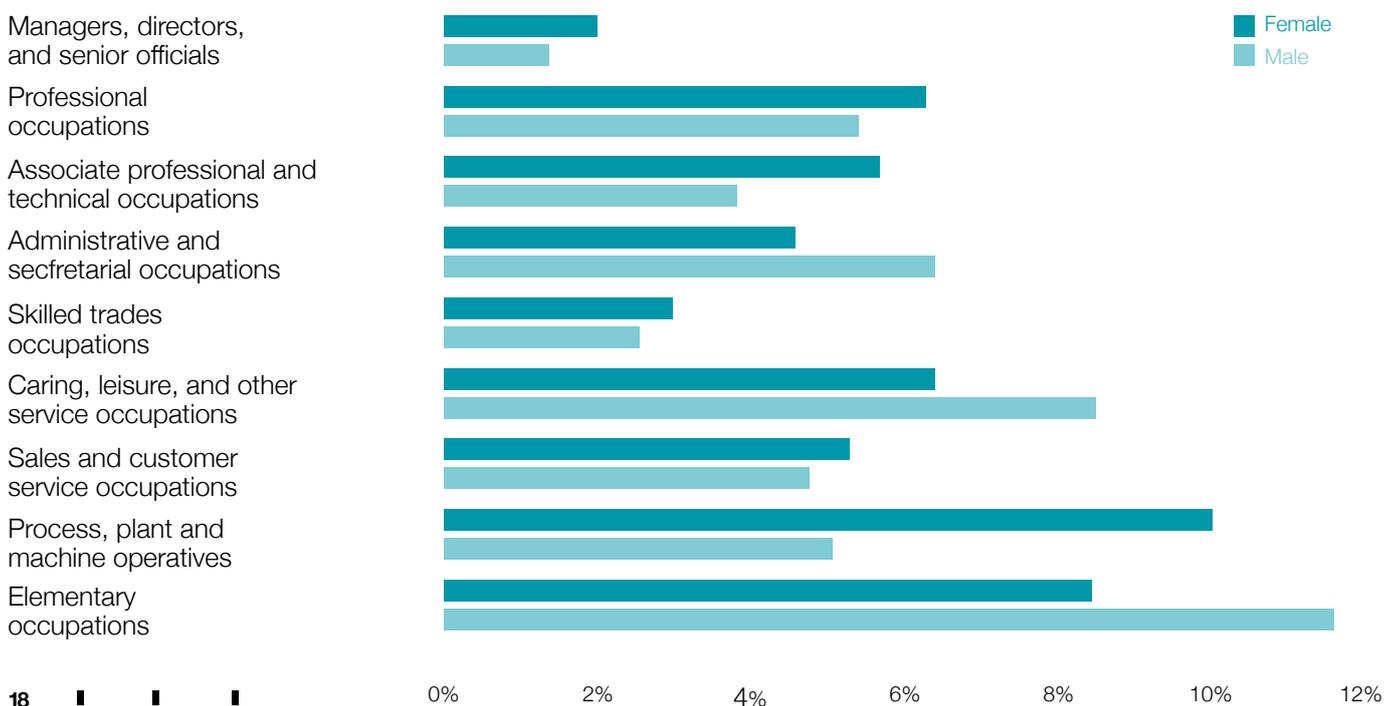
Source: Author's calculations using Annual Population Survey accessed via NOMIS (ONS, 2018a).

Industry	2004 (%)			Change in ratio (% pts)			2008 (%)		
	High	Medium	Low	High	Medium	Low	High	Medium	Low
Agriculture & fishing	14	48	37	+2	+5	-7	16	53	30
Energy & water	37	23	40	+8	-	-8	45	23	32
Manufacturing	34	32	34	+8	-3	-4	42	29	30
Construction	24	60	17	+6	-6	-	30	54	17
Distribution, hotels & restaurants	24	19	57	+1	-1	-	25	18	57
Transport & Communication	40	15	45	+8	-5	-3	48	10	42
Banking finance & Insurance etc.	52	28	20	+8	-7	-1	60	21	19
Public admin education & health	54	17	29	+4	-4	-	58	13	29
Other services	37	23	40	+10	-7	-4	47	16	36
Total	40	25	35	+7	-5	-2	47	20	33

FIGURE 5.3

Non-permanent employment by occupational category.

Source: Author's calculations using Annual Population Survey accessed via NOMIS (ONS, 2018a).



5.2 Precarious employment

Insecurity

One potential indicator of labour market insecurity is the proportion of the labour force engaged in self-employment or other forms of flexible or casual work arrangements. However, there have been significant increases in both self-employment and other forms of flexible working amongst low skill occupations since 2004. An ONS study (2018b) found that the proportion of self-employed workers without employees increased by 66.5% between 2001 and 2016, whilst the number with employees declined by 11.2% over the same period. See section 5.2.3 for discussion of self-employed earnings.

Tomlinson and Corlett (2017) link the growth in self-employment, along with other forms of insecure working arrangements such as agency work and zero-hours contracts, to rising precarity. The trend is specific to the UK suggesting it is a result of particular labour market policies. They argue that differences in statutory rights, for example the right to the minimum wage or protections from unfair dismissal, and differences in the way tax is charged between employees and self-employed contractors, in particular employer's National Insurance, is driving the rise.

Whilst forms of flexibility, which reduce unit labour costs and avoid long-term commitments on the part of employers, have likely contributed to the fall in unemployment, it places workers at considerable risk in the face of an economic downturn. Media attention tends to focus on the gig economy in which the use of these forms of non-standard employment contract is widespread. In 2017, approximately 400,000 workers were regularly employed in the gig economy with a further 700,000 occasionally using these platforms to supplement their existing incomes (Balaram et al., 2017). Although they make up a relatively small share of the labour market the rapid growth of platforms offering low skill services in the past 5 years points to the ways in which technology can combine with lax labour market regulations to disrupt established industries. For consumers and shareholders, they provide enormous benefits, but as will be discussed in Section 8 it is important to ensure that workers' rights are protected to avoid widening inequality and rising levels of precarious employment.

Another feature of the labour market which suggests that insecurity is higher amongst less skilled workers is the underemployment rate, measuring whether workers would prefer to work longer hours at their current rate of pay. Amongst graduates the rate is 7.0% whilst 9.4% of non-graduates would like longer hours. The rate is higher in London, where 11.9% of non-graduates are underemployed. Focusing on low income workers earning less than £315 per week, the rate rises to 16% for full-time workers and 19% for part-time workers (ONS, 2019b).

Low skill occupations tend to have significantly higher rates of job insecurity with 11.6% of men in elementary occupations having a non-permanent job, more than double the average of 5.4%.

Perhaps the most explicit measure of job insecurity is the percentage of employees whose job is in some way non-permanent. Figure 5.3 shows the percentage of non-permanent employment broken down by sex and occupation. Low skill occupations tend to have significantly higher rates of job insecurity with 11.6% of men in elementary occupations having a non-permanent job, more than double the average of 5.4%.

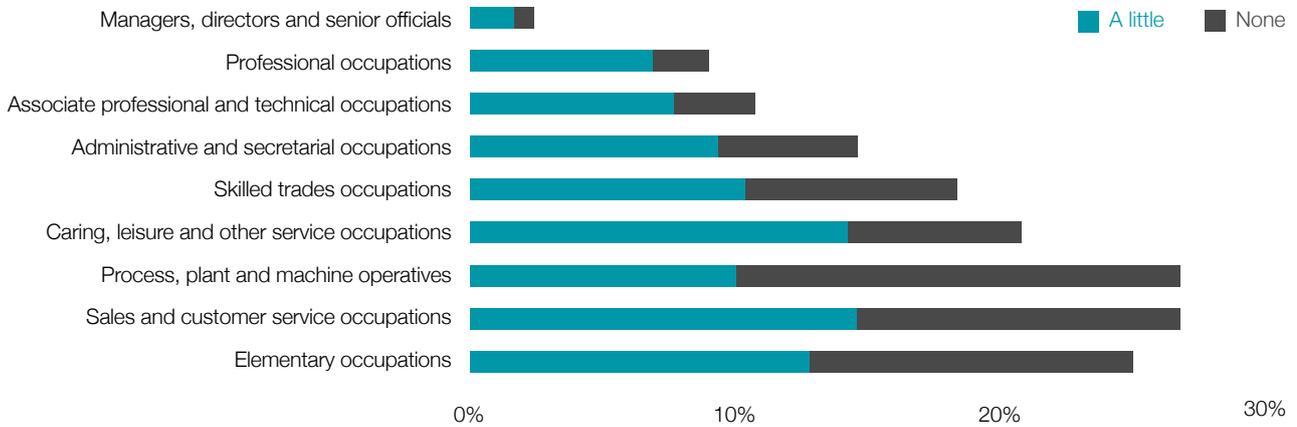
The conclusion across these various measures of insecurity is that it concentrates amongst workers in the least skilled occupations, which are also those most at risk from future technological change.

FIGURE 5.4

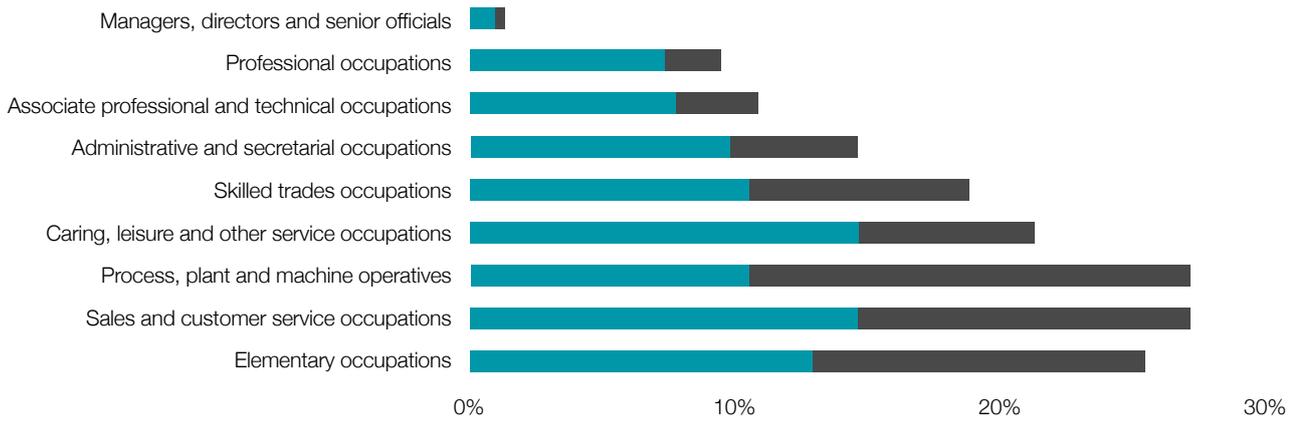
Workers' autonomy and influence over their work.
 Author's calculations using Workplace
 Employment Relations Survey, 2011 (BIS, 2015)

How much influence do you have over...

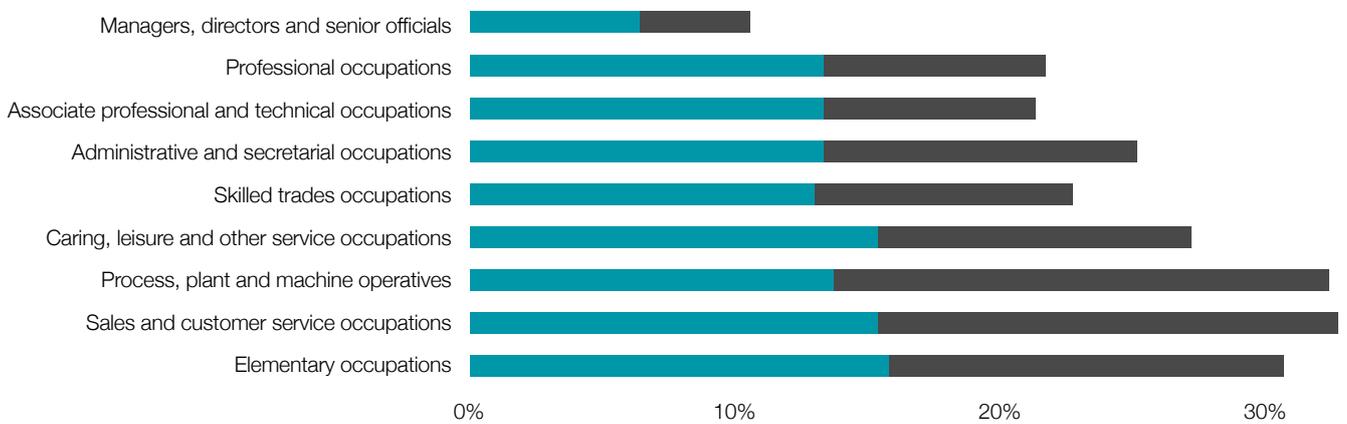
... the tasks you do in your job?



... the order carry out tasks?



... the pace at which you work?



Job Quality

As with insecurity, there is no single measure which can be used to analyse changes in job quality on a systematic basis. The Labour Force Survey lacks good measures, but the most appropriate indicator is the prevalence of job-related training. This has declined by around 5 percentage points for most workers since 2004, suggesting firms are investing less in the training and development of their workers. In addition to this overall decline there is a large disparity between high and low skilled workers. On average, graduates were 6 percentage points more likely to receive training in the prior 13-week period than non-graduates. Those in managerial and professional occupations (the highest skilled) are more than twice as likely (34.3%) to receive job-related training as those working in private services (19.3%) and production (16.1%). This is a particular concern and should be a focus of government policy (see section 7 and 8), as it risks entrenching existing inequalities and limits the ability of low skilled workers to adapt to technological change.

Using data from the 2011 Workplace Employment Relations Survey (WRES), figure 5.4 shows the relationship between different occupational categories and various measures of influence over work. As expected, the percentage of respondents who report having little or no influence over their work increases as skill-level declines. This has implications for the potential susceptibility to technological change, as rigidly controlled processes are generally easier to automate, but also on a more personal level it suggests limited opportunity to progress and develop new skills.

Income

Income is the easiest indicator of precarious employment to measure. As has been widely reported, the incomes of low earners have experienced limited growth over the past 40 years. Figure 5.5 shows the mean equivalised real disposable household income by quintile for non-retired households with children. The bottom quintile has seen incomes rise by just 2.24% per annum, in contrast to the top quintile who saw annual growth of 4.7% in real terms. However, since 2004 income growth has been extremely limited across all quintile groups averaging just 0.66% per annum in real terms.

As previously discussed, the number of self-employed workers has increased significantly suggesting a rise in insecurity. This observation is compounded by the finding that the earnings of those in self-employment fell by 24.5% in real terms between 2007/8 and 2013/14 to just £10,800. Over the same time period median earnings of the self-employed fell by 9 percentage points relative to those of employees (BIS, 2016) suggesting that an increasing number of people are engaged in low-income self-employment indicating a rise in precarious employment amongst this population.

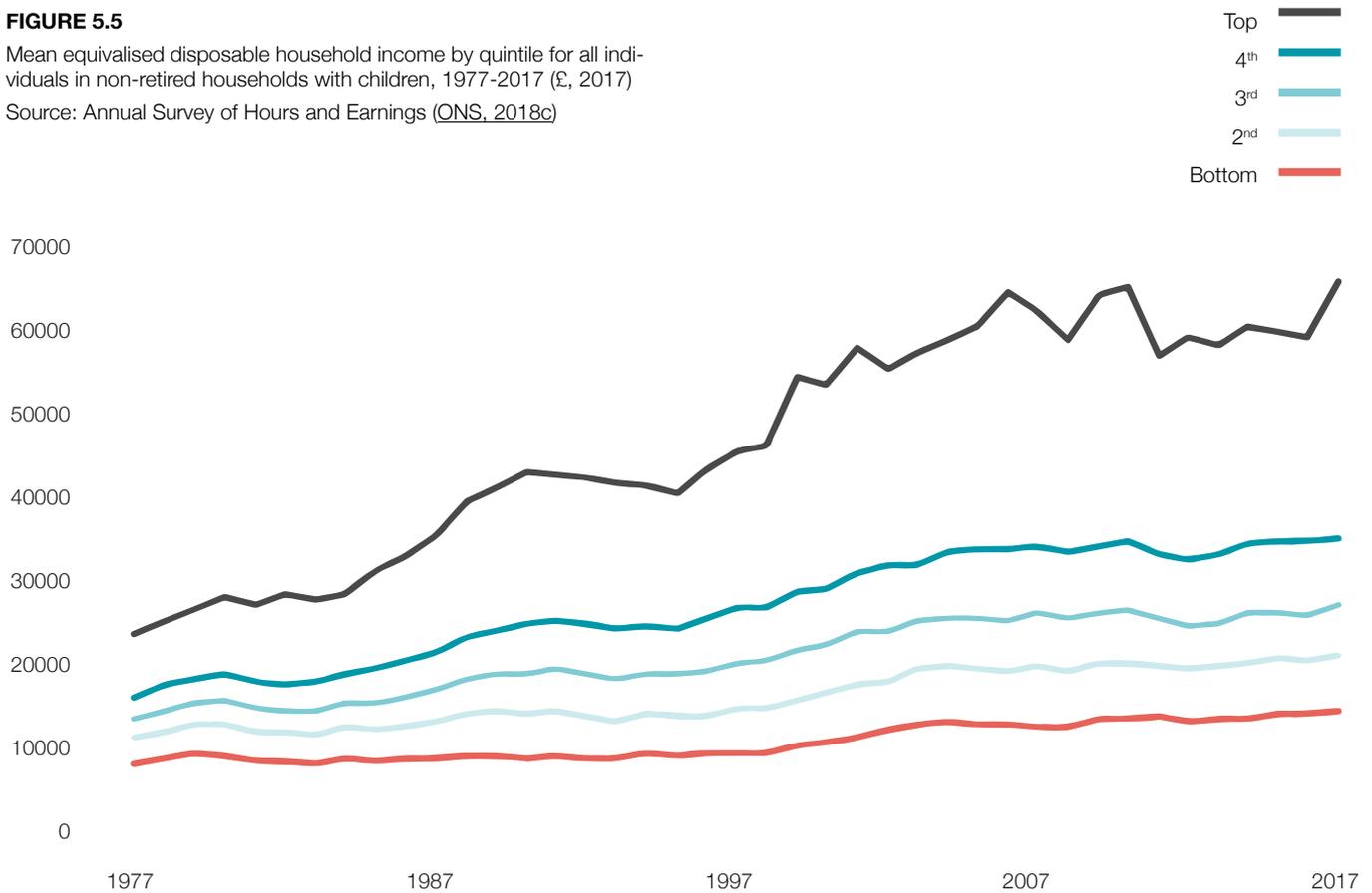
Workers with no qualifications saw pay rise by 14.7% although three quarters of the increase occurred since 2015 suggesting it is linked to the increase in the minimum wage.

Contrary to expectations, graduates saw a modest, real terms fall of 5.9% in real median gross hourly pay between 2003 and 2019 (ONS, 2014a, 2014b, 2019b). In contrast, workers with no qualifications saw pay rise by 14.7% although three quarters of the increase occurred since 2015 suggesting it is linked to the increase in the minimum wage in 2016 (see section 7.1). The explanation for declines in graduate pay is more complex but maybe linked to the growth in the supply of graduates outpacing the growth in graduate-level jobs. The proportion of non-recent graduates in non-graduate jobs rose from 29% in 2003 to 37% in 2017 and similar upward trends can be seen for recent graduates (ONS, 2017). However, there remains a 40% graduate wage premium suggesting that demand for higher-level skills remains robust.

FIGURE 5.5

Mean equivalised disposable household income by quintile for all individuals in non-retired households with children, 1977-2017 (£, 2017)

Source: Annual Survey of Hours and Earnings (ONS, 2018c)



5.3 Precarious employment in the non-graduate labour market

Lower skill occupations, with the exception of process, plant and machine operatives, have significantly higher rates of precarious employment.

In order to assess the extent of precarious employment across the UK labour market, it is necessary to examine the extent to which low incomes, job insecurity and low job quality intersect. Using data from the Apr-Jun 2018 Labour Force Survey (LFS), proxy indicators have been created to estimate the extent to which individuals are impacted by multiple indicators of precarious employment. Low income is defined as having a gross weekly income of less than £315, equivalent to 35 hours at £9/hr. Job quality is proxied by whether an individual received job-related training in the last 13 weeks. Two measures of labour market insecurity are used: whether a respondent was underemployed, defined as being willing to work longer hours for the same basic pay, and whether they are in non-permanent employment. Precarious employment is defined as having 3 or more negative indicators. As the LFS does not collect income data for self-employed individuals, the analysis was restricted to employees only. The analysis only focuses on 25 – 64 as those under 25 are more likely to engage in training or hold non-permanent positions.

The results, presented in figure 5.6, are split by qualification and occupational category and show the percentage suffering from precarious employment. Out of a total population of 21.5 million, 4.1% had 3 or more negative indicators, however, this headline figure masks substantial differences. Lower skill occupations, with the exception of process, plant and machine operatives, have significantly higher rates of precarious employment. Qualifications appear to have relatively little impact pointing to the importance of occupational change in driving changes in labour market outcomes. Standing's (2011) conception of the traditional working class as having low incomes but stronger job security offers a potential explanation for the low rates of precarious employment amongst process, plant and machine operatives.

FIGURE 5.6

Incidence of precarious employment by qualification and occupation.

Source: Author's calculations based on Apr-Jun 2018 Labour Force Survey (ONS, 2019a)

Major occupation group	Level of highest qualification held						
	NQF Level 4 and above	NQF Level 3	Trade apprenticeships	NQF Level 2	Below NQF Level 2	Other qualifications	No qualifications
Managers, Directors And Senior Officials	1.6%	0.6%	0.0%	0.0%	0.0%	0.0%	3.1%
Professional Occupations	2.2%	1.7%	0.0%	1.3%	0.0%	0.0%	11.8%
Associate Professional And Technical Occupations	1.1%	3.1%	3.9%	0.5%	0.0%	4.6%	0.0%
Administrative And Secretarial Occupations	5.4%	3.6%	4.0%	2.0%	5.9%	2.5%	8.7%
Skilled Trades Occupations	1.7%	0.0%	0.0%	0.0%	1.1%	11.0%	4.8%
Caring, Leisure And Other Service Occupations	10.8%	5.2%	14.9%	3.9%	8.9%	6.0%	3.0%
Sales And Customer Service Occupations	7.8%	7.3%	9.2%	10.8%	13.3%	4.9%	7.4%
Process, Plant And Machine Operatives	4.0%	1.7%	7.1%	3.5%	1.0%	3.8%	3.0%
Elementary Occupations	11.6%	17.1%	3.4%	15.4%	13.3%	8.6%	10.0%

FIGURE 5.7

Incidence of precarious employment by occupation and age.

Source: Author's calculations based on Apr-Jun 2018 Labour Force Survey (ONS, 2019a)

Major occupation group	Age groups in 5-year intervals								Total
	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	
Managers, Directors And Senior Officials	0.0%	1.2%	1.6%	0.7%	2.2%	0.0%	1.5%	0.0%	1.0%
Professional Occupations	1.3%	3.6%	1.8%	1.3%	1.9%	1.1%	2.2%	3.9%	2.0%
Associate Professional And Technical Occupations	0.8%	1.9%	1.4%	0.0%	3.2%	0.6%	1.5%	1.2%	1.4%
Administrative And Secretarial Occupations	0.0%	6.4%	4.6%	5.7%	2.3%	3.5%	4.9%	8.2%	4.2%
Skilled Trades Occupations	2.1%	1.3%	8.4%	0.0%	1.5%	0.7%	0.0%	1.3%	2.0%
Caring, Leisure And Other Service Occupations	7.9%	3.1%	10.1%	16.8%	5.0%	3.0%	5.4%	5.8%	7.2%
Sales And Customer Service Occupations	11.9%	10.5%	6.2%	12.9%	9.9%	4.2%	7.6%	9.0%	9.2%
Process, Plant And Machine Operatives	6.1%	2.1%	2.8%	4.2%	2.5%	1.3%	1.4%	5.6%	3.0%
Elementary Occupations	9.6%	14.6%	15.3%	22.3%	12.5%	11.0%	7.9%	7.3%	12.3%
Total	3.7%	4.5%	4.5%	5.4%	4.1%	2.4%	3.5%	4.8%	

Extending the analysis, figure 5.7, shows the relationship between precarious employment, occupation and age, suggesting that precarious employment is a feature of low skill occupations. It would be reasonable to hypothesise that precarity would decline with age as workers gain skills and experience; however, amongst low skill occupations it appears to peak between the ages of 40-44, suggesting that for those in precarious employment this process does not take place.

These estimates suffer from the same challenges as similar analysis conducted by Bailey (2016), namely the difficulty in creating robust measures of job quality and insecurity, and thus should be interpreted with caution. However, it is possible to conclude that precarious employment is a common experience amongst workers in low skill occupations and, taking account of the worsening trends in multiple variables over time, is becoming more prevalent.

It would be reasonable to hypothesise that precarity would decline with age as workers gain skills and experience; however, amongst low skill occupations it appears to peak between the ages of 40-44, suggesting that for those in precarious employment this process does not take place.

A major critique of the National Living Wage is that the wage rate is not actually linked to living standards.

06. Current labour market policies

This section will analyse the current policies of the UK government in relation to the labour market, focusing on two policy areas which impact low skilled workers: the flagship policy of raising the minimum wage for workers over 25 and reform of the further education sector which is responsible for technical and vocational training and skills policy.

6.1 National living wage

The National Living Wage was announced in the 2015 Budget by, then Chancellor of the Exchequer, George Osborne MP. The objective of the policy is to raise the minimum wage for workers over 25 to 60% of median earnings by 2020, forecast to be £9 per hour⁴ (Pyper, 2015). Approximately 20% of workers earned below the target threshold in 2015, a level that had been fairly stable since the early 1990s. Raising the minimum wage has seen small but steady reductions in the percentage of people on low pay, with the proportion falling to 18% in 2017. The policy appears to have had few spillover effects on the number of jobs or productivity (D'Arcy, 2018).

Whilst these headline outcomes have been positive, a major critique of the National Living Wage is that the wage rate is not actually linked to living standards. The Living Wage Foundation calculates a wage rate required to meet a minimum standard of living to be £9 per hour outside London and £10.55 in London, compared to the current National Living Wage of £8.21 per hour (Living Wage Foundation, 2019a; D'Arcy, 2017). In 2017, 6.2 million people or 23% of employees earned less than this 'real' living wage (D'Arcy, 2017).

Figure 6.1 shows the distribution of real hourly wages in 1997, 2007, 2015 and 2016. Wages for low wage workers fell in real terms between 2007 and 2015, with an increase in the number of employees receiving the minimum wage. The national living wage in 2015 shifted the distribution to the right, raising the wage floor, but the increased clustering around this level shows that a greater proportion of workers are now receiving the minimum wage and the proportion of workers receiving wages of between £10 and £18 per hour remains below the level of 2007. This suggests that raising the minimum wage increased earnings for the very lowest paid but had limited impact in terms of raising wages for lower paid workers more broadly.

NOTE 04

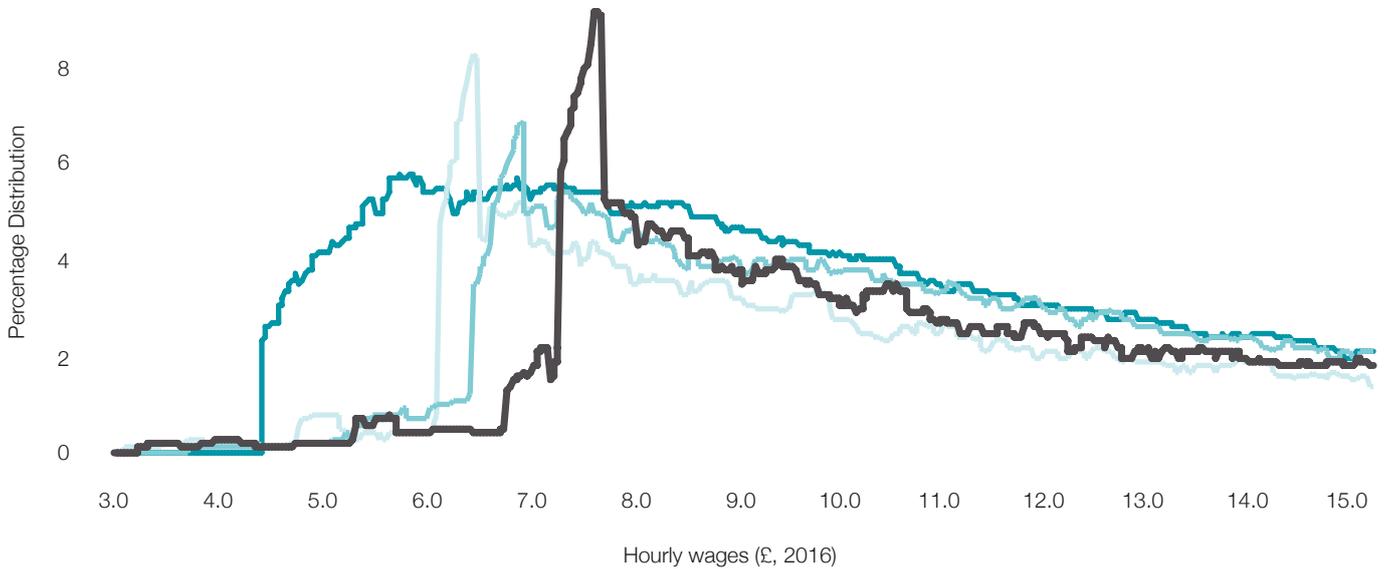
Assuming the national minimum wage would have increased in line with average earnings, the policy results in the national living wage being 13% higher than it otherwise would have been. *Source: D'Arcy, 2018.*

FIGURE 6.1

Distribution of inflation-adjusted gross hourly wages. Inflation adjusted using Consumer Prices Index including housing costs (CIPH).

Source: Author's calculations based on Apr-Jun 2018 Labour Force Survey (ONS, 2019a)

1997 —
2007 —
2015 —
2016 —



Raising the minimum wage increased earnings for the very lowest paid but had limited impact in terms of raising wages for lower paid workers more broadly.

Is there scope to increase the minimum wage further? The impact on job losses have thus far been benign and so there is potentially scope for further increases, although these should be cautious. Jardim et al. (2017) found that the initial increase in Seattle's minimum wage from \$9 to \$11 had no significant employment effects, whilst the increase to \$13 reduced total hours worked amongst the low paid by 6-7%. The study focused on the restaurant sector, observing a shift towards self-service restaurants as employers looked to reduce labour costs. Furthermore, organisational restructuring and investments in automation take time to implement and thus there may be a lag before disemployment effects are observed.

Whilst raising the minimum wage is a positive step for low wage workers, the increase in income was blunted by other changes to the welfare system, notably cuts to working tax credits. The Work and Pensions Committee (2015) found that the net effect of introducing the national living wage, reducing tax credits and changes to the personal allowance was likely to be negative for the majority of low wage workers⁵, with some workers experiencing a 93% marginal 'tax' rate, reducing incentives to work (Whittaker, 2017). Furthermore, since 2010 the 'incentive reinforcement' elements of the welfare system have been heightened in the form of stricter conditionality, for example job search requirements, and the implementation of sanctions. Bonoli (2010) describes these as having strong pro-employment effects, perhaps part explaining the record low levels of unemployment but no or negative impacts on human capital investment. Thus, whilst raising the wage floor is welcome, the net impact on household disposable income is likely to be limited and the incentives for people to take up low skill, low wage employment rather than investing in developing more valuable skills does not create an environment that enables people to adapt to structural changes in the labour market.

NOTE 05

For example, a single earner working 35 hours per week on the national minimum wage with two school age children earned an additional £900 a year on the national living wage. However, after changes to tax thresholds and tax credits the family would be £1,378 worse off.

6.2 Education, training and skills

As discussed, whilst the national living wage is beneficial, it is a blunt policy which does little to address the structural forces driving changes in the low skill labour market. The remainder of this section will discuss training, education and skills policy, specifically focusing on the further education (FE) sector, which can be broadly divided into two categories, 16-19 and adult (19+) education.

Vocational training and the further education system (across both categories) have undergone continual reforms over the past 20 years. The Independent Panel on Technical Education (pg.8, 2016) described the system as having “serious problems”, being “overcomplex” and failing “to provide the skills most needed for the 21st century”. Whilst many of these problems are the result of a long history of poorly implemented reforms⁶, the challenges facing the further education sector have been exacerbated by an 8% reduction in real 16-19 spending per student since 2010. Likewise, the adult skills budget fell by 45% over the same period. The only area which benefited is the share devoted to 19+ apprenticeships which increased from £400m to £800m, rising as a proportion of the total budget from 13% in 2010 to 36% in 2018. The net effect is that the quality and reputation of technical and vocational training is low, and the economic value of many qualifications is therefore questionable.

The 16-19 category covers both academic (A-levels) and vocational or technical qualifications at a variety of different institutions, including sixth-form and further education colleges. In 2018, 82% of 16-19 years olds engaged in some form of further education or training, of which 45% followed a non-academic route (Belfield et al., 2018). In response to the Independent Panel on Technical Education report, the Department for Education is planning a major overhaul of technical qualifications by implementing T-levels for 15 occupational categories, with the aim of improving their quality and standing through standardisation and higher degrees of rigour. T-levels will include 3-month mandatory work placements, are aimed primarily at 16-19 year olds and will be delivered through FE colleges.

Although there appears to be a broad consensus amongst the academic and professional community that T-levels are a positive development (Education Committee (2018)), Belfield et al. (2018) raise concerns over the timetable of their implementation, suggesting that the target of 2020 is overly ambitious and risks damaging the quality of the qualifications.

NOTE 06

One possible explanation is the lack of experience amongst politicians and civil-servants with the further education system, having been almost exclusively university educated. This effect is also present in the dominant media discourse which features lengthy discussions about university tuition fees despite less than a third of 18-19 years olds studying for an undergraduate degree.
Source: [ONS, 2017](#).

The Education Committee (2018) found significant concerns over the quality of apprenticeships, the robustness of the qualifications gained and the ease of access.

The flagship policy targeting the adult education category is apprenticeships - there has been a significant increase in the range of apprenticeship schemes and the number of external service providers involved in their provision since 2010. However, the Education Committee (2018) found significant concerns over the quality of apprenticeships, the robustness of the qualifications gained and the ease of access, highlighting the lack of a central portal similar to that used for higher education. The Department for Education is in the process of implementing apprenticeship standards, however, the breadth of different stakeholders makes enforcement challenging.

In 2017-18, approximately 376,000 people started apprenticeships having risen from 175,000 in 2005. Of these, 46% were over 24, 25% were 19-24 year olds and 25% were under-19s (Powell, 2019). Whilst it is positive that older workers are able to access opportunities, it also suggests that firms may be choosing to classify existing workers as apprentices in order to access funds

from the Apprenticeship Levy, a tax payable by large employers which can be used for funding apprenticeship schemes, and thus not necessarily providing pathways into skilled employment.

Hupkau et al. (2017) highlight the focus on degree-level apprenticeships, arguing that this risks focusing resources on students who would otherwise have the ability to go to university, rather than as a tool for improving the prospects of less advantaged individuals. The Sutton Trust (testimony recorded in Education Committee, 2018) highlights the lack of clear progression pathways from lower to higher/degree-level apprenticeships which is particularly important when considering notions of job quality. Entry-level apprenticeships enable the development of tangible skills and experience, but they need to be coupled with opportunities for career progression and further training and development.

Belfield et al. (2018) argue that the current apprenticeship system is too focused on narrowly specialised occupational skills which have limited transferability, potentially making their holders susceptible to future technological change. This contrasts with the German apprentice system, which features a limited number of occupational apprenticeship categories and combines technical skills with more transferrable general skills such as business administration and project management, as well as a focus on the development of socio-emotional skills which are increasingly valuable in the labour market (Deming, 2017). These provide the basis for future career advancement, as well as offering the potential for identifying and implementing productivity enhancements (Froy & Giguere, 2010).

Entry-level apprenticeships enable the development of tangible skills and experience, but they need to be coupled with opportunities for career progression and further training and development.

Treating the symptoms through efforts to raise incomes and improve the labour market security of low skill workers; or by treating the cause with policies to promote the development of higher-level skills.

07. Policy options

As discussed in Section 5, precarious employment is increasingly common amongst low skill workers as a result of changes to the occupational structure of the labour market and a weakening of their relative bargaining power, driven by technological change. This section will build upon the findings outlined in section 5, developing a number of policy responses situated within the current policy context outlined in section 6. The policies proposed aim to address certain specific issues facing low skill workers in the UK labour market - there is no suggestion that they alone are sufficient to redress the rise of inequality in wealth, income and opportunity. Furthermore, whilst efforts have been made to ensure that they are realistic and prudent, no attempt is made to fully assess their political or fiscal feasibility.

Multiple challenges face low skill workers and, given the continuing pace of technological change, these trends are highly likely to continue. The problem can be stated succinctly – workers possessing basic levels of technical, vocational and general skills no longer command sufficient bargaining power to ensure high wages and secure employment. This can be addressed in two ways: treating the symptoms through efforts to raise incomes and improve the labour market security of low skill workers; or by treating the cause with policies to promote the development of higher-level skills, in particular those skills which are augmented by, rather than replaced by, technology.

Section 7.1 will review the potential for further increases in the minimum wage and provide a brief discussion on Universal Basic Income, finding the evidence to support its implementation currently lacking. Section 7.2 discusses the need to reduce differentiation between the statutory rights of different categories of worker, which is a key factor in the rise of job insecurity, discussed in the context of the gig economy. Finally, section 7.3 will conclude with a discussion of adult learning and development, building upon existing policies and drawing heavily on the experience of Singapore.

7.1 Minimum wage and universal basic income

Raising the minimum wage is an important, if blunt, policy tool for delivering real terms pay increases for the lowest paid. As discussed in section 6.1, the minimum wage for over 25 year olds has risen significantly in real terms since 2016. However, this continues to be below the level calculated by the Living Wage Foundation (2019b) based on the cost of living. Given the downward pressure on low skill wages due to technological change, it is highly unlikely that workers earning the wage floor will see a real terms pay rise unless the floor continues to be increased⁷. Consequently, the government should extend its policy of real terms increases in the value of the minimum wage, ensuring that, at a minimum, it keeps pace with the cost of living. In addition, as there does not appear to have been significant employment disincentive effects, the rate should gradually be increased beyond the living wage for over 25 year olds. Given that disemployment effects are more likely to be experienced by the young (Jardim et al., 2017), some differentiation is warranted, however, the rates for those under 25 should also be increased proportionately. There is clearly a risk that raising the minimum wage significantly will incentivise firms to invest in automation or make the business models of large employers of low wage workers uncompetitive. Consequently, the Low Pay Commission should continue to monitor the effects on employment.

NOTE 07

As discussed in section 6.1 the real value of the minimum wage fell between 2007 and 2015 whilst the proportion of workers earning the wage floor increased.

The government should extend its policy of real terms increases in the value of the minimum wage, ensuring that, at a minimum, it keeps pace with the cost of living.

An alternative policy, which is often discussed in relation to the impact of technological change on the labour market, is a Universal Basic Income (UBI) in which all resident citizens would receive a regular payment, regardless of employment status or means. There are a number of arguments in favour, - a UBI would raise incomes whilst simultaneously acting to reform the welfare system and make it more responsive to the needs of workers who lack stable, permanent employment and move between multiple employers and periods of unemployment. Another benefit is that, in contrast to means-tested welfare payments, it does not suffer from the same work-disincentive effects. Under the current welfare system, workers taking a minimum wage job may experience an 80% marginal tax rate as benefits are withdrawn. A detailed discussion on the merits of UBI, including the ethical argument in favour, can be found in Standing (2019).

Perhaps the most important argument in favour of UBI is that workers facing rapid technological change will require significant support in order to retrain and develop new technology-augmenting skills. Unfortunately, this also highlights the core issue, summarised neatly by Martinelli (2017) - "an affordable UBI would be inadequate, and an adequate UBI would be unaffordable". He modelled various scenarios, finding that a payment equal to current welfare benefits would cost £326bn (1.5 times current welfare expenditure). A payment of £2,200 per year, paid in addition to existing welfare payments, would have a net cost of £140bn after eliminating the personal allowance. For context, in 2015/16 HMRC collected £533.6bn in tax revenue, of which 52.9% was from payroll taxes, 21.6% from VAT and 8.3% from corporation tax. Given the ability of multinational firms to engage in tax avoidance using tax-policy arbitrage, there is limited scope for increasing corporation tax rates significantly, and VAT is generally considered a regressive form of taxation. Consequently, significant increases in payroll taxes would be required to fund even a modest UBI⁸. Whilst further research and pilots are warranted to explore the externalities associated with UBI, it does not yet warrant serious consideration. That said, a more generous, flexible safety net will be required for those impacted by technology-induced unemployment who need to undertake retraining to find new employment (Greve, 2017).

NOTE 08

£140bn increase in payroll tax receipts achieved by 9% increase in the basic rate, 10% increase in the higher rate, elimination of the upper threshold for National Insurance and elimination of the Personal Allowance, equivalent to raising taxes by £4,461 per year for the median employee.

Source: author's calculations based on data in [Martinelli, 2017](#).

7.2 Employees, workers and the self-employed

One of the risks associated with raising the minimum wage is that it incentivises firms to look for novel means to reduce labour costs, for example through the classification of workers as independent contractors rather than employees. This is one potential explanation for the growth in self-employment described in Section 5. Unlike employees, independent contractors are not eligible for statutory rights such as paid holiday, sick leave or unfair dismissal. There are multiple different categories of workers recognised by law – employees, self-employed, workers, agency workers and employee-shareholders. Workers dependent on another organisation for work are entitled to minimum wage and working time restrictions but not other statutory rights. Under this system, the basis of a ‘good quality’ job is linked to the classification as an employee.

This is a particular issue in the gig economy. A majority of gig workers are highly skilled freelancers, but growth in the sector has been driven by low skilled service jobs as new platforms have emerged in the past 5-10 years - there are now an estimated 40,000 Uber drivers in London. In the context of disruptive technologies enabling new business models, a rigid approach is not appropriate and risks harming the workers it aims to protect. 62% of gig workers identified flexibility and control as a major benefit of gig economy jobs and most used the platforms to supplement their income. In addition, the business models of online platforms vary substantially. Whilst Uber was forced to reclassify drivers as ‘workers’ rather than ‘self-employed’ after losing a court case in 2016, in the case of sites such as MyBuilder, which matches skilled trades people with potential clients and does not act as a financial intermediary, the self-employed classification is appropriate. Balaram et al. (2017), in analysing the gig economy, argue that the characteristics of different types of employment should be more clearly articulated by the government and enforced in order to avoid misclassification.

Misclassification is not only a problem in the gig economy, as evidenced by the substantial growth in part-time, independent self-employment. Whilst the aim is not to prevent flexible working arrangements when beneficial to all parties, it is important to ensure that safeguards and regulations ensure that the relationship is mutually beneficial. The government should simplify the process of challenging employment status by adjusting the balance of evidence such that a firm must show why a ‘worker’ is not entitled to that classification and the associated rights to the minimum wage. Given the likely growth of these forms of contractual arrangement there is a compelling case that ‘workers’ should have the ability to accrue rights to holiday and sick pay on a prorata basis, thereby reducing the differentiation between ‘employees’ and ‘workers’ minimising the incentive for firms to misclassify.

The characteristics of different types of employment should be more clearly articulated by the government and enforced in order to avoid misclassification.

7.3 Adult skills policy

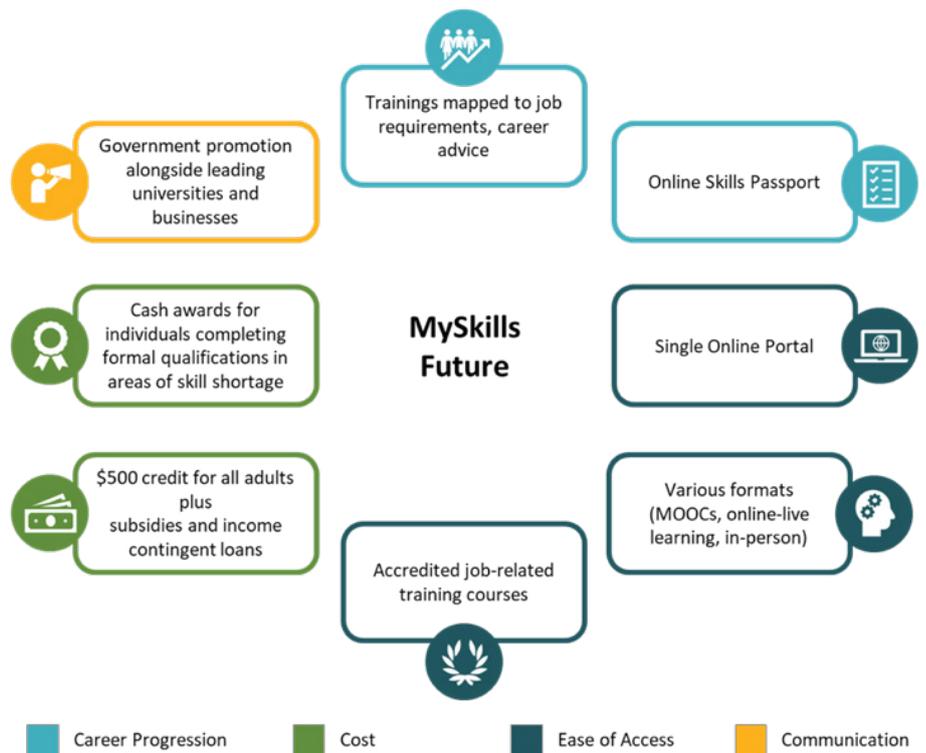
This section will deal exclusively with policies focused on adult skills and life-long learning. Whilst much could be written about the 16-19 Further Education system and apprenticeships, both are undergoing significant reforms drawing on international best practice (as discussed in section 6.2) and thus it would be premature to offer a substantial critique.

In contrast, adult skills and life-long learning lacks a coherent policy framework, despite the widely accepted view that workers will continuously need to retrain and gain new skills throughout their working lives in order to ameliorate and adapt to continual technological change. In comparison to other countries, employers and the government in the UK invest relatively little in skills

FIGURE 8.1

MySkills Future Singapore.

Source: Author based on Skills Future Singapore Agency (2019) and OECD (2019).



development and government cuts to the adult skills budget are likely to disproportionately impact low skilled individuals (Luchinskaya & Dickinson, 2019).

At its core, an adult skills, education and training policy framework should be focused on enabling workers to gain skills which are augmented by technology. These include socio-emotional skills such as assisting and caring for others, persuasion and negotiation, skills involving originality, creativity and problem solving as well as technical or vocational skills involving high degrees of manual dexterity (Frey & Osborne, 2013; Deming, 2017). In addition, general business and ICT skills potentially have positive spillovers in terms of both enhancing productivity and career development (Froy & Giguère, 2010).

Any framework should address the disparity in training uptake and skills investment between high and low skilled workers, aiming to create a “virtuous circle of learning” (Luchinskaya & Dickinson, 2019). To do this, there should be two core principles: reducing barriers to uptake, be they cost, time or information barriers; and ensuring that qualifications and courses are robust, rigorous and recognised. An example of a successful adult skills policy is Singapore’s MySkills Future program, which aims to equip workers with the skills to be competitive in the future labour market. The key features of the policy are outlined in Figure 8.1 (OECD, 2019).

For low wage workers, the cost of undertaking training can be prohibitively expensive to self-finance, especially those leading to formal qualifications. Recognising this, the government’s policy has focused on incentivising employers to provide training and apprenticeships via the Apprenticeship Levy (see section 6.2). This raises over £2.2bn per year, however, only 9% of levied funds (NAO, 2019) were used in the first year, with reports suggesting that the inflexibility of the programme, along with minimum requirements for offsite training, made providing training uneconomic for many firms, especially those employing low-skilled workers (Scott, 2019).

Those interested in developing skills are dependent on their employers to provide or sponsor training opportunities, which tend to be concentrated in large employers, typically those employing highly educated workers (OECD, 2019).

Consequently, the system is not conducive to low skilled workers impacted by technological change building skills outside of those demanded by their current employer. As such, the government should use the over £2bn of unspent funds from the apprenticeship levy to provide individuals with credit which can be used to fund accredited courses on a platform similar to the Singaporean example (see Box A). Assuming a 10% take up rate for all working age adults in the first year, this would enable each individual to receive a subsidy of c.£500 towards the cost of training⁹.

NOTE 09

Authors calculations based on figures in [NAO \(2019\)](#).

There are several features of the Singaporean example which could provide the outlines of a policy framework, including the development of an online platform providing links to accredited courses, skills assessments, careers advice and skills and learning pathways. An important feature of the policy is that qualifications are sufficiently robust to appear valuable to employers. Consequently, employers should be involved in the accreditation system and in developing the occupational and industry specific skills pathways.

The availability of online courses (MOOCs) and online live learning in recent years has substantially reduced the challenges in delivering training programmes, however, it is important that assessments are rigorous – the model of accountancy and other professional qualifications which employ online learning combined with marked examination and assessments could be used for formal qualifications.

Finally, in response to the challenge of finding time to dedicate to training, the government should legislate for a statutory right to training of 4 days per annum for full time employees¹⁰ which can be used on any accredited training programme. However, reducing barriers to entry is not sufficient to engrain a culture of adult learning and development. Less skilled individuals report significantly lower levels of interest and participation in adult learning, which further acts to reinforce existing inequalities. Whilst this is extremely difficult to address, it is important that there are multiple, transparent access routes to training and skills development and that the benefits are clearly communicated (OECD, 2019).

NOTE 10

Policy coupled with recommendations on worker classification.

The over £2bn of unspent apprenticeship levy funds should be used to fund accredited training courses.

Ensuring that everyone in employment can maintain an adequate standard of living and has access to the same basic rights is an important first step towards the development of more equitable labour market.

08. Conclusion

Technological change is driving changes to the occupational structure of the labour market. Medium skilled occupations such as administrative and secretarial work are declining and those without the skills complemented by technology are pushed into low skill occupations which suffer from significantly higher levels of precarious employment. Within low skilled occupations, the types of jobs are also changing. The growth of e-commerce has led to a reduction of 20% in the number of retail assistants and cashiers since 2005, offset by growth in both high skilled managerial roles but also an increase in the number of elementary warehousing and distribution jobs, which have notoriously poor working conditions. James Bloodworth in his book 'Hired' (2018), in which he went undercover in an Amazon warehouse, describes how workers were unable to take toilet breaks for fear of missing productivity targets and facing disciplinary action. The media regularly details stories of similar treatment in other warehousing operations. These forms of exploitative practices are enabled by limited, poorly enforced regulation supported by institutional belief in flexible labour markets as a driver of growth (Gallie, 2013 in Greve, 2017).

These forms of exploitative practices are enabled by limited, poorly enforced regulation supported by institutional belief in flexible labour markets as a driver of growth.

Precarious employment is just one factor driving a broader sense of precarity. For workers in the bottom income quintile in private rented accommodation, between 30-40% of disposable income (including housing benefit) is spent on housing (ONS, 2019e) and they are subject to short tenancies, no-fault evictions and arbitrary rent increases. Exploring the relationship between housing costs, precarious employment and investments in education and skill development could be an avenue for future research.

Another potential area for further investigation is the extent to which high-skill jobs and precarious employment are geographically concentrated, as this could inform the development of policies targeted to the needs of specific communities. Initial analysis at a regional level suggests that whilst high-skill jobs are growing in all regions, by far the strongest growth is in London, which also has the lowest levels of precarious employment.

Without sustained action on the part of government, precarious employment amongst low skill workers is likely to continue to grow. There are no easy solutions - investment in education, training and skills is necessary, but the pay-offs will only occur over generational time frames. In the short-term, ensuring that everyone in employment can maintain an adequate standard of living and has access to the same basic rights is an important first step towards the development of more equitable labour market.

References

- Acemoglu, D. and Autor, D. (2011) 'Skills, Tasks and Technologies: Implications for Employment and Earnings', in Handbook for labour economics. Elsevier, pp. 1043–1171. doi: 10.1016/S0169-7218(11)02410-5.
- Acemoglu, D. and Restrepo, P. (2017) Automation and local labour markets, NBER. 23285. Available at: <https://novafrica.org/wp-content/uploads/2017/06/Daron-Acemoglu.pdf> (Accessed: 16 April 2019).
- Arntz, M., Gregory, T. and Zierahn, U. (2016) The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. 189. Paris. doi: 10.1787/5jlz9h56d-vq7-en.
- Aldred, J. (2019) 'How economics corrupted us', RSA Events Podcast. Available at: <https://www.thersa.org/events/2019/06/how-economics-corrupted-us>
- Autor, D. H. (2015) 'Why Are There Still So Many Jobs? The History and Future of Workplace Automation', Journal of Economic Perspectives, 29(3), p. p.3-30. doi: 10.1257/jep.29.3.3.
- Autor, D. H., Levy, F. and Murnane, R. J. (2003) 'The skill content of recent technological change: An empirical exploration', The Quarterly Journal of Economics, 118(4), pp. 1279–1333. Available at: <https://economics.mit.edu/files/11574> (Accessed: 16 April 2019).
- Bailey, N. (2016) 'Exclusionary employment in Britain's broken labour market', Critical Social Policy, 36(1), pp. 82–103. doi: 10.1177/0261018315601800.
- Balaram, B., Warden, J. and Wallace-Stephens, F. (2017) Good Gigs A fairer future for the UK's gig economy. Available at: https://www.thersa.org/globalassets/pdfs/reports/rsa_good-gigs-fairer-gig-economy-report.pdf (Accessed: 1 July 2019).
- Bastani, A. (2019) Fully Automated Luxury Communism. Verso.
- Belfield, C., Farquharson, C. and Sibieta, L. (2018) 2018 Annual Report on Education Spending in England. Available at: <http://www.ifs.org.uk> (Accessed: 23 July 2019).
- Bhattacharjee, A. (2012) Scholar Commons Social Science Research: Principles, Methods, and Practices. Tampa, Florida. Available at: http://scholarcommons.usf.edu/oa_textbooks/3 (Accessed: 14 May 2019).
- [BIS] Department of Business, Innovation & Skills (BIS) (2016) The income of the self-employed. London. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/500317/self-employed-income.pdf (Accessed: 19 August 2019).
- Blanchfower, D. G. (2019) Not Working: Where have all the good jobs gone. Princeton University Press.
- Bughin, J. et al. (2018) Skill Shift: Automation and the future of the workforce. Available at: www.mckinsey.com/mgi. (Accessed: 18 April 2019).
- Card, D. and Lemieux, T. (2001) Can Falling Supply Explain the Rising Return to College for Younger Men? A Cohort-Based Analysis, The Quarterly Journal of

Economics. Available at: <http://davidcard.berkeley.edu/papers/men-return-college.pdf> (Accessed: 5 June 2019).

Care Quality Commission (2017) State of Care 2017. Available at: www.cqc.org.uk/stateofcare (Accessed: 6 August 2019).

Cavaglia, C., McNally, S. and Ventura, G. (2018) Do Apprenticeships Pay? Evidence for England. Available at: <http://cver.lse.ac.uk/textonly/cver/pubs/cverdp015.pdf> (Accessed: 24 July 2019).

Clark, I. and Colling, T. (2018) 'Work in Britain's Informal Economy: Learning from Road-Side Hand Car Washes', *British Journal of Industrial Relations*, 56(2), pp. 320–341. doi: 10.1111/bjir.12286.

Collier, P. (2019) *The future of capitalism: Facing the new anxieties*. Penguin Books Ltd.

D'Arcy, C. (2018) *Low Pay Britain 2018*. London. Available at: <https://www.resolutionfoundation.org/app/uploads/2018/05/Low-Pay-Britain-2018.pdf> (Accessed: 19 June 2019).

D'Arcy, C. (2017) *Low Pay Britain 2017*. Available at: <https://www.resolutionfoundation.org/app/uploads/2017/10/Low-Pay-Britain-2017.pdf> (Accessed: 19 June 2019).

Deming, D. J. (2017) 'The growing importance of social skills in the labor market', *The Quarterly Journal of Economics*, 132(4), pp. 1593–1640. Available at: https://scholar.harvard.edu/files/ddeming/files/deming_socialskills_aug16.pdf (Accessed: 18 April 2019).

Engels, F. (1845) *Condition of the Working Class in England*. Panther Ed. Available at: <https://www.marxists.org/archive/marx/works/download/pdf/condition-working-class-england.pdf>

Education Committee (2018) *The apprenticeships ladder of opportunity: quality not quantity - Sixth Report of Session 2017-19 Report*. House of Commons. London. Available at: www.parliament.uk. (Accessed: 25 July 2019).

Ford, M. (2015) *Rise of the Robots: Technology and the Threat of a Jobless Future*. Basic Books.

Frey, C. B. and Osborne, M. (2013) *THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?* Oxford. Available at: https://ora.ox.ac.uk/objects/uuid:4ed9f1bd-27e9-4e30-997e-5fc8405b0491/download_file?safe_filename=future-of-employment.pdf&file_format=application%2Fpdf&type_of_work=Journal+article (Accessed: 16 April 2019).

Froy, F. and Giguère, S. (2010) *Putting in Place Jobs that Last: A Guide to Rebuilding Quality Employment at Local Level*. 13. Paris. doi: 10.1787/5km7jf7qt-k9p-en. (Accessed: 13 August 2019).

Goos, M. and Manning, A. (2003) *Lousy and Lovely Jobs: the Rising Polarization of Work in Britain*. Available at: http://eprints.lse.ac.uk/20002/1/Lousy_and_Lovely_Jobs_the_Rising_Polarization_of_Work_in_Britain.pdf (Accessed: 3 June 2019).

Green, F., Felstead, A. and Gallie D. (2015). "The Inequality of Job Quality" in *Unequal Britain at Work*. Oxford University Press. Oxford

Greve, B. (2017). *Technology and the Future of Work – The impact on labour markets and Welfare States*. Edward Elgar Publishing. Cheltenham, UK.

Hupkau, C. et al. (2017) 'Post-Compulsory Education in England: Choices and Implications', *National Institute Economic Review*, (240), pp. 42–56. Available at: <https://journals.sagepub.com/doi/pdf/10.1177/002795011724000113> (Accessed: 24 July 2019).

Independent Panel on Technical Education (2016) *Report of the Independent Panel on Technical Education*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/536046/Report_of_the_Independent_Panel_on_Technical_Education.pdf (Accessed: 24 July 2019).

- Jardim, E. et al. (2017) Minimum Wage Increases, Wages, and Low-Wage Employment: Evidence from Seattle. 23532. Cambridge MA. Available at: <http://www.nber.org/papers/w23532> (Accessed: 16 April 2019).
- Katz, L. F. (1999) 'Changes in the Wage Structure and Earnings Inequality', in *Handbook for labour economics*. 3rd edn. Elsevier, p. 1463. Available at: https://scholar.harvard.edu/files/lkatz/files/changes_in_the_wage_structure_and_earnings_inequality.pdf (Accessed: 3 June 2019).
- Katz, L. F. and Murphy, K. M. (1992) 'Changes in Relative Wages, 1963-1987: Supply and Demand Factors', *The Quarterly Journal of Economics*, 107(1), pp. 35-78. Available at: https://scholar.harvard.edu/files/lkatz/files/changes_in_relative_wages_1963-1987_supply_and_demand_factors.pdf (Accessed: 5 June 2019).
- Lewis, H. et al. (2015) 'Hyper-precarious lives: Migrants, work and forced labour in the Global North', *Progress in Human Geography*, 39(5), pp. 580-600. doi: 10.1177/0309132514548303.
- Living Wage Foundation (2019a), What is the real living wage: Explaining UK wage rates. [Website] Available at: <https://www.livingwage.org.uk/what-real-living-wage> (Accessed 23 July 2019)
- The Living Wage Foundation (2019b) Living Hours: Providing security of hours alongside a real Living Wage. London.
- Luchinskaya, D. and Dickinson, P. (2019) The adult skills gap: is falling investment in UK adults stalling social mobility? Warwick. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774085/Adult_skills_report_2019.pdf (Accessed: 14 August 2019).
- Mack, J. et al. (2013) Poverty and Social Exclusion in the UK Attitudes to necessities in the PSE 2012 survey: are minimum standards becoming less generous? Available at: www.poverty.ac.uk (Accessed: 7 June 2019).
- Martinelli, L. (2017) Assessing the Case for a Universal Basic Income in the UK. Bath. Available at: <https://www.bath.ac.uk/publications/assessing-the-case-for-a-universal-basic-income-in-the-uk/attachments/jpr-assessing-the-case-for-a-universal-basic-income-in-the-uk.pdf> (Accessed: 14 August 2019).
- Mills, C. (2012) The Great British Class Fiasco: A Comment on Savage et al. Available at: https://ora.ox.ac.uk/objects/uuid:7576f63a-6bd3-466f-8e23-8f3f87669ed9/download_file?safe_filename=GBCS_fiasco_v2.pdf&file_format=application%2Fpdf&type_of_work=Journal+article (Accessed: 6 June 2019).
- Mishel, L., Schmitt, J. and Shierholz, H. (2013) 'Assessing the Job Polarization Explanation of Growing Wage Inequality', in *Labour Economics Seminar*. Ber. Available at: https://eml.berkeley.edu/~webfac/moretti/e251_s13/mishel.pdf (Accessed: 17 April 2019).
- NAO (2019) The apprenticeships programme. HC 1987 - Session 2017-19. Available at: <https://www.nao.org.uk/wp-content/uploads/2019/03/The-apprenticeships-programme.pdf> (Accessed: 14 August 2019).
- OECD (2019), *OECD Skills Strategy 2019: Skills to Shape a Better Future*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264313835-en>. (Accessed: 13 August 2019).
- Office for National Statistics (2018b) Trends in self-employment in the UK. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/trendsinselfemploymentintheuk/2018-02-07> (Accessed: 6 August 2019).
- Office for National Statistics (2018d) The probability of automation in England. London. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/theprobabilityofautomationinengland/2011and2017> (Accessed: 18 April 2019).
- Painter, A. and Thoung, C. (2015) *Creative citizen, creative state: the principled and pragmatic case for a Universal Basic Income*. London. Available at: https://www.thersa.org/globalassets/reports/rsa_basic_income_20151216.pdf (Ac-

cessed: 1 August 2019).

Penn R., Rose M. & Rubery J. (1994). *Skill & Occupational Change*. Oxford University Press. Oxford

Powell, A. (2019). *Apprenticeship Statistics: England*. Briefing papers Number 06113, 11 February 2019. Available at: researchbriefings.files.parliament.uk/documents/SN06113/SN06113.pdf

PWC (2018) *Will robots really steal our jobs?*. London. Available at: www.pwc.co.uk/economics (Accessed: 18 April 2019).

Pyper, D. (2015). National Living Wage announcement. Commons Briefing papers CBP-7255, 13 July 2015. Available at: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7255>

Robert, C. and Zeckhauser, R. (2011). 'The methodology of normative policy analysis', *Journal of Policy Analysis and Management*, 30(3), pp. 613–643. doi: 10.1002/pam.20578.

Rubery J. and Wilkinson F. (1994). *Employer Strategy and the Labour Market*. Oxford University Press. Oxford

Savage, M. et al. (2013). 'A New Model of Social Class? Findings from the BBC's Great British Class Survey Experiment', *Sociology*, 47(2), pp. 219–250. doi: 10.1177/0038038513481128. (Accessed: 18 June)

Scott, E. (2019) *Apprenticeship Levy and Workplace Opportunities for Young People*. London. Available at: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/LLN-2019-0085> (Accessed: 14 August 2019).

Skills Future Singapore Agency (2019). *MySkills Future*. [Website] Available at: <https://www.myskillsfuture.sg/content/portal/en/index.html> (Accessed on: 11 August 2019)

Standing, G. (2012) *The Precariat: The New Dangerous Class*. Bloomsbury Academic. doi: 10.1177/0094306112468721dd. (Accessed: 12 June 2019).

Standing, G. (2019) *Basic Income as Common Dividends: Piloting a Transformative Policy*. Available at: https://www.progressiveeconomyforum.com/wp-content/uploads/2019/05/PEF_Piloting_Basic_Income_Guy_Standing.pdf (Accessed: 3 June 2019).

Tinbergen, J. (1974) 'Substitution of graduate by other labour', *Kyklos: international review for social sciences*. Available at: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1467-6435.1974.tb01903.x> (Accessed: 5 June 2019).

The Economist. (2019) *Will a robot really take your job?*. The Economist. Print Edition June 29th – July 5th 2019. Available at: <https://www.economist.com/business/2019/06/27/will-a-robot-really-take-your-job>. (Accessed: 4 July 2019).

Whittaker, M. (2017) *Freshly Squeezed Autumn Budget 2017 response*. Resolution Foundation. Available at: <https://www.resolutionfoundation.org/app/uploads/2017/11/Budget-response.pdf> (Accessed: 23 July 2019).

Woo, J. J. (2017) 'Educating the developmental state: policy integration and mechanism redesign in Singapore's SkillsFuture scheme'. doi: 10.1080/17516234.2017.1368616. (Accessed: 8 August 2019).

Work and Pensions Committee (2015) *A reconsideration of tax credit cuts - Third Report of Session 2015-16 Report*. House of Commons. London. Available at: www.parliament.uk. (Accessed: 23 July 2019).

Data Bibliography

[BIS] Department for Business, Innovation and Skills (2015). Workplace Employee Relations Survey, 2011, [Data], UK Data Service, 6th Edition, Accessed 26 August 2019. SN: 7226, <http://doi.org/10.5255/UKDA-SN-7226-7>

Office for National Statistics, Social Survey Division (2014a). Quarterly Labour Force Survey, April - June, 2003, [Data], UK Data Service, 3rd Edition, Available: <http://doi.org/10.5255/UKDA-SN-5422-2> (Accessed 18 July 2019)

Office for National Statistics, Social Survey Division (2014b). Quarterly Labour Force Survey, April - June, 2011, [Data], UK Data Service, 2nd Edition, Available at: <http://doi.org/10.5255/UKDA-SN-6851-2> (Accessed 18 July 2019)

Office for National Statistics (2017). Graduates in the UK labour market: 2017. [Data]. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/graduatesintheuklabourmarket/2017#steady-increase-in-the-number-of-graduates-in-the-uk-over-the-past-decade> (Accessed: 7th August, 2019)

Office for National Statistics (2018a) Annual Population Survey. [Data], Available at: <https://www.nomisweb.co.uk> (Accessed: 29 July 2019)

Office for National Statistics (2018b) Trends in self-employment in the UK. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/trendsinselfemploymentintheuk/2018-02-07> (Accessed: 6 August 2019).

Office for National Statistics (2018c) The effects of taxes and benefits on household income, provisional estimate: 2019. Annual Survey of Hours and Earnings. [Data]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyearending2019provisional> (Accessed: 6 August 2019)

Office for National Statistics (2018d) The probability of automation in England. [Data] Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/theprobabilityofautomationinengland/2011and2017> (Accessed: 18 April 2019).

Office for National Statistics, Social Survey Division (2019a). Quarterly Labour Force Survey, April - June, 2018, [Data], UK Data Service, 3rd Edition, Available at: <http://doi.org/10.5255/UKDA-SN-8381-3> (Accessed 4 July 2019)

Office for National Statistics, Social Survey Division (2019b), Quarterly Labour Force Survey, January - March, 2019, [Data], UK Data Service, Available at: <http://doi.org/10.5255/UKDA-SN-8485-1> (Accessed 25 June 2019)

Office for National Statistics (2019c). EARN06: Gross weekly earnings by occupation. [Data]. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/grossweeklyearningsbyoccupationearn06> (Accessed: 7 August 2019)

Office for National Statistics (2019d). EMP15: Job related training received by employees. [Data]. Available at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/jobrelatedtrainingreceivedbyemployeesemp15> Accessed: 2 August 2019)

Office for National Statistics (2019e). Detailed household expenditure as a percentage of total expenditure by disposable income decile group: Table 3.2. [Data]. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datasets/detailedhouseholdexpenditureasapercentageof>