NEW SKILLS AT WORK
JP MORGAN CHASE & CO.

IPPR

March 2015

Edited by Tony Dolphin

TECHNOLOGY, GLOBALISATION AND THE FUTURE OF WORK IN EUROPE

ESSAYS ON EMPLOYMENT IN A DIGITISED ECONOMY

Institute for Public Policy Research

ABOUT THE PROGRAMME

The JPMorgan Chase New Skills at Work programme aims to identify strategies and support solutions that help improve labour market infrastructure and develop the skilled workforce globally. The initiative brings together leading policymakers, academics, business leaders, educators, training providers and nonprofits with the goal of connecting labour market policy with practice, supply with demand and employers with the workforce – all to strengthen the global economy.

ABOUT JPMORGAN CHASE

JPMorgan Chase & Co (NYSE: JPM) is a leading global financial services firm with assets of $2.5 trillion and operations worldwide. The firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing, asset management and private equity. More information is available at www.jpmorganchase.com.

While this report has been supported by the JPMorgan Chase Foundation, the contents and opinions in this collection are those of IPPR and the authors and do not reflect the views of the JPMorgan Chase Foundation, JPMorgan Chase & Co, or any of its affiliates.

ABOUT IPPR

IPPR, the Institute for Public Policy Research, is the UK's leading progressive thinktank. We are an independent charitable organisation with more than 40 staff members, paid interns and visiting fellows. Our main office is in London, with IPPR North, IPPR's dedicated thinktank for the North of England, operating out of offices in Newcastle and Manchester.

The purpose of our work is to conduct and publish the results of research into and promote public education in the economic, social and political sciences, and in science and technology, including the effect of moral, social, political and scientific factors on public policy and on the living standards of all sections of the community.

IPPR
4th Floor
14 Buckingham Street
London WC2N 6DF
T: +44 (0)20 7470 6100
E: info@ippr.org
www.ippr.org
Registered charity no. 800065

TECHNOLOGY, GLOBALISATION AND THE FUTURE OF WORK IN EUROPE

Essays on employment in a digitised economy

Edited by Tony Dolphin

March 2015

ABOUT THE EDITOR

Tony Dolphin is senior economist and associate director for economic policy at IPPR.

ACKNOWLEDGMENTS

Our thanks go to all the authors for their invaluable contributions to this excellent collection.

Download
This document is available to download as a free PDF and in other formats at:
http://www.ippr.org/publications/technology-globalisation-and-the-future-of-work-in-europe

Citation
If you are using this document in your own writing, our preferred citation is:

Dolphin T (ed) (2015) *Technology, globalisation and the future of work in Europe: Essays on employment in a digitised economy*, IPPR.
http://www.ippr.org/publications/technology-globalisation-and-the-future-of-work-in-europe

CONTENTS

ABOUT THE AUTHORS

Terence Hogarth is based at the Institute for Employment Research (IER) at Warwick University. He has around 30 years' experience researching UK and EU labour and training markets. His recent work has concentrated on the operation of apprenticeship systems, and the measurement and assessment of skill mismatches in the UK and in the EU. Since the mid-1990s he has directed the 'Net Costs / Benefits of Apprenticeships to Employers' study for the Department of Employment and its successor ministries. He is currently leading a programme of research analysing skill mismatches.

Rob Wilson leads the University of Warwick Institute for Employment Research's forecasting programme, which, for the past 40 years, has produced projections of future skill demand for the UK government. The most recent set of projections have been published by the UK Commission for Employment and Skills under the 'Working Futures' banner. He is currently leading a multinational research team that is producing projections of the future demand for and supply of skills in the European Union and its member states. This programme of research is being funded by Cedefop. He is also involved in modelling skills demand in a number of countries outside of the EU.

Jonathan Wadsworth is a professor of economics at Royal Holloway College, University of London. He obtained his undergraduate degree from the University of Hull and his MSc and PhD from the London School of Economics and Political Science. He is a senior research fellow at the LSE's Centre for Economic Performance; deputy director of CReAM, the Centre for the Analysis and Research in Migration at University College London; and a member of the UK Home Office's Migration Advisory Committee. His research interests are in applied labour economics, particularly issues of migration, unemployment compensation schemes, workless households, job search, discrimination, inequality, minimum wages, union activity and the labour markets of eastern Europe.

Andries de Jong has worked as a senior researcher on demography and the housing market at the PBL Netherlands Environmental Assessment Agency since 2005, where he is project leader of the PBL/CBS regional demographic forecast, and was involved in the project DEMIFER for ESPON. Previously, he worked

at Statistics Netherlands, where he was involved in several studies on population and the labour force (on behalf of the European Commission). He holds an MSc in human geography and sociology from the University of Groningen.

Mark ter Veer worked at the PBL Netherlands Environmental Assessment Agency between 2009 and 2012, and was involved in the ESPON project DEMIFER. He holds an MSC in population studies from the University of Groningen.

Matthew Whittaker is chief economist and acting deputy chief executive at the Resolution Foundation thinktank. He has published numerous reports on the labour market, taxes and benefits, government finances, household debt and social policy. He took a leading role in defining the low- to middle-income group that is the focus of the Resolution Foundation's work, and has served on many working groups and advisory panels on issues relating to living standards. He also serves as the foundation's liaison with the Employment, Equity and Growth programme being undertaken by the Institute for New Economic Thinking at Oxford University.

Peter Glover is senior research manager at the UK Commission for Employment and Skills (UKCES). He was a co-author of the major UKCES report *The Future of Work: Jobs and Skills in 2030*, published in 2014. Previously, he worked for Skillfast-UK, the sector skills council for the apparel, footwear and textile industry.

Hannah Hope is research manager at the UK Commission for Employment and Skills (UKCES). She previously held research roles at the Standards Board for England and the West Yorkshire Police Authority.

Michael J Handel is associate professor of sociology at Northeastern University in Boston. He studies trends in labour market inequality and job skill requirements, particularly the impacts of changes in technology, work roles, and organisational structure. His research has examined questions of skills mismatch and the impact of computers and employee involvement practices on wages, skills and employment. He holds a PhD in sociology from Harvard University.

Werner Eichhorst joined IZA as a research associate in July 2005, became senior research associate in February 2006, deputy director of labour policy in April 2007 and director of labour policy Europe in January 2014. From 1999 to 2004 he was project director at the Bertelsmann Foundation, a private thinktank in Germany, where he was responsible for comparative analyses of the German labour market and related policy areas, and worked at the Institute for Employment Research (IAB), from 2004 to 2005. His main research area is the comparative analysis of labour market institutions and performance, as well as the political economy of labour market reform strategies.

Michael Fischer is programme manager for trade unions and co-determination at Friedrich Ebert Stiftung. He has a longstanding interest in models of alternative economic development.

Jörg Bergstermann is coordinator of the trade union programme for Europe and North America at Friedrich Ebert Stiftung (FES). Previously, he led several international offices of FES, most recently in Hanoi, Vietnam.

David Brady is director of the inequality and social policy department at the WZB Berlin Social Science Center. He earned a PhD in sociology and public affairs from Indiana University in 2001. He is the author of *Rich Democracies, Poor People* (Oxford University Press) and is finishing editing *The Oxford Handbook of the Social Science of Poverty* (with Linda Burton). He studies poverty and inequality, social policy, politics and labour, among other topics.

Thomas Biegert is a postdoctoral research fellow in the inequality and social policy department at the WZB Berlin Social Science Center. He works on social stratification, comparative labour markets, welfare states and quantitative methods. In 2014 he completed his PhD at the University of Mannheim. He recently published 'On the Outside Looking In? Transitions Out of Non-employment in the United Kingdom and Germany' in the *Journal of European Social Policy*.

Sigurt Vitols is a senior researcher at the WZB, lecturer in personnel management at the Free University Berlin, non-resident fellow at the American Institute for Contemporary German Studies, and associate researcher at the European Trade Union Institute in Brussels. His recent publications include *Financialisation, New Investment Funds, and Labour: An International Comparison* (coedited with Howard Gospel and Andrew Pendleton, Oxford University Press, 2014) and *European company law and the Sustainable Company: a stakeholder approach* (coedited with Johannes Heuschmid, ETUI 2012).

Thor Berger is an associate fellow of the Oxford Martin Programme on Technology and Employment at Oxford University and a PhD candidate in the department of economic history at Lund University. His work aims to understand how new technologies have reshaped the growth potential of cities over the past century, why some places provide substantially more upward mobility for their inhabitants, and how technological advances in the 21st century will alter the labour market.

Carl Benedikt Frey is codirector of the Oxford Martin Programme on Technology and Employment at Oxford University, and Oxford Martin Citi Fellow. He is a doctor of economic history at Lund University, an economics associate of Nuffield College, Oxford, and specialist advisor to the Digital Skills select committee of the House of Lords. His research interests include the transition of industrial

nations to digital economies, and subsequent challenges for economic growth and employment. In particular, his work focusses on technology shocks and their associated impacts on labour markets and urban development.

Steve Bainbridge is an expert at Cedefop, the European Centre for the Development of Vocational Training. He is a former editor of the European Journal of Vocational Training (1996–2001) and has written three Cedefop reports on European VET policy: *An age of learning* (1999), *Learning for employment* (2004) and *A bridge to the future* (2010). Most recently he drafted the final version of Cedefop's *Future skill supply and demand in Europe* (2012) and helped develop a set of statistical indicators to monitor the performance of national VET systems published in *On the Way to 2020: data for vocational education and training policies* (2013). He currently writes Cedefop's briefing notes series.

Stefana Broadbent leads Nesta's research work on collective intelligence, exploring the new forms of knowledge and problem-solving that are emerging from the collaboration of networked publics, institutions and organisations. Prior to joining Nesta, Stefana was a lecturer in digital anthropology in the Department of Anthropology at UCL. Stefana has a degree in psychology from the University of Geneva and a PhD in cognitive science from the University of Edinburgh. Her recent publications include chapters in the *The Onlife Manifesto* (2015) and *Digital Anthropology* (2012), and her book *L'intimite au Travail* (2011) received the AFCI prize for social sciences.

Sara de la Rica is a professor of economics at the University of the Basque Country. She is a research fellow at FEDEA, the Foundation for Empirical Economic Analysis in Madrid, at IZA and at CReAM. Her research is focussed on the empirical analysis of the labour market, particularly on gender economics, the economic analysis of immigration and the economic analysis of labour institutions. She has published her research in a range of academic journals, including *Economic Enquiry, Labor Economics, Journal of Population Economics, Industrial and Labour Relations Review, Journal of Human Resources, Economica* and *Spanish Economic Review*.

Henning Meyer is a research associate at the Public Policy Group of the London School of Economics and Political Science, and an honorary fellow of the Global Policy Institute at Durham University. He is also director of the consultancy New Global Strategy Ltd and editor-in-chief of the website Social Europe. He was a visiting fellow at the School of Industrial and Labor Relations at Cornell University and is a regular commentator on economic and political issues in the international press.

Diane Coyle is a professor of economics at the University of Manchester and runs the consultancy Enlightenment Economics. She has been a BBC trustee for eight years, and was formerly a member of the Migration Advisory Committee and the Competition Commission. She specialises in the economics of new technologies, globalisation, and competition policy, and has worked extensively on the impacts of mobile telephony in developing countries. Her books include *GDP: A Brief but Affectionate History*, *The Economics of Enough: How to run the economy as if the future matters*, and *The Soulful Science* (all Princeton University Press). She was previously economics editor of the Independent and before that worked at HM Treasury and in the private sector as an economist.

Alan Manning is professor of economics at the London School of Economics and is director of the Centre for Economic Performance's community research programme. He has written widely on labour market issues. He holds a DPhil in economics from the University of Oxford.

Donald Storrie is head of the Employment and Change Unit at the Eurofound (an EU agency). He was previously director of the Centre for European Labour Market Studies in Sweden. He has published on a wide range of topics on labour economics and European employment policy. He has also worked as business editor at the main Swedish business daily newspaper, and as research officer at the Swedish Ministry of Employment. He holds a BSc in mathematics and a PhD in economics from Gothenburg University.

Tony Dolphin is IPPR's senior economist and leads its work on economic policy, which focusses on the changes that are needed to the UK's economy to ensure that growth in the future is better balanced and more sustainable and that the benefits of growth are more evenly shared. Tony is a regular commentator in the media on the economy and on economic policy and writes on a range of issues, including skills, the outlook for growth and the structure of the UK economy. He has previous edited or co-edited IPPR collections on colleges (2010), apprenticeships (2011) and new economic thinking (2012).

INTRODUCTION

TONY DOLPHIN
IPPR

The industrial structure of European economies and the types of occupation that they support are changing. This change takes many forms in different national contexts, but there are some common themes. There has been an increase in service-sector employment, both in low-skilled customer service work and in high-skilled 'knowledge' occupations, and a corresponding drop in manufacturing employment. This has contributed to a 'polarisation' of the workforce in many countries, with more high-skill and low-skill jobs but fewer requiring mid-level skills. At the same time, young people are finding it increasingly hard to get a foothold in the labour market, and the proportion of the workforce employed on full-time, permanent contracts has shrunk.

Some of the changes are cyclical, the result of recession followed by a stuttering recovery. The rise in temporary work, for example, might be expected to recede when European economies are again growing strongly enough to bring unemployment down towards its pre-recession level. Other changes, however, are the result of major structural forces operating in the global economy: the rapid pace of technological innovation, globalisation and demographic change. These forces are likely to continue to cause dislocation and disruption in European labour markets for the foreseeable future. As a result, there will be a fundamental shift in the types of jobs that are available for workers and in the skills demanded by employers across Europe.

At the end of 2014 there were over 24 million people unemployed in the EU28 countries – one in 10 of the potential workforce (Eurostat A). This represents a massive waste of resources. Understanding the likely changes in the European labour market over the next decade is essential if policymakers and firms are to set Europe onto a path towards permanently lower unemployment through the creation of many more well-paid jobs.

The purpose of this collection of essays is to highlight the most likely trends in employment across Europe over the next 10 years, and to find out how experts think policymakers, firms and individuals should respond. The first set of essays examines the changing nature of Europe's labour market; the authors in this section analyse how globalisation and technological change in particular are likely to affect

the demand for skills over the next decade. The second set of essays looks to Germany for lessons that can be taken from its past reforms. The third section focusses on the likely effects of technological change, which it is generally agreed is driving the biggest changes in labour markets, and on the most appropriate policy responses. Then, in a final essay, we present the results of a survey of over 2,500 companies across five European countries, which provide some interesting findings on the skills employees are using, polarisation on a sectoral level, and how firms are responding by increasing or cutting staff numbers.

The changing shape of Europe's labour market

Putting aside the effects of the recession, there have been two main drivers of change in Europe's labour markets in recent years: globalisation and technological innovation. Neither is new: there have been previous waves of globalisation, most particularly in the late 19th century, and technological innovation has been a constant feature – albeit at varying paces – since the beginning of the industrial revolution. But the pace of both in recent years is widely seen as exceptional.

This is indisputable in the case of globalisation. In the space of less than 20 years, over 1 billion people have been added to what might be termed the 'global market economy'. This has created opportunities, and many firms have succeeded in selling into the new markets that have been opened up in China and elsewhere. But it has also created threats. Low-paid workers have undercut workers in developed economies, and there has been a major transfer of production to emerging economies, with a consequent reduction in the demand for relatively low-skilled workers in developed economies.

It may be, however, that the biggest effects of this wave of globalisation are in the past. Wage levels have increased in the emerging world, making it less profitable to transfer production there, and there is some evidence of 'reshoring' – firms bring production back to developed economies. However, this development might not always be to the benefit of those low-skilled workers who lost their jobs when production was moved to emerging economies. One impetus for reshoring is that technological innovation now means production requires fewer low-skilled workers to be on hand.

There is more of a debate – mainly being conducted in the United States – about the pace of technological innovation and its effects on the economy. On one side are those who argue that we are in the middle of a massive leap in technology that will boost productivity levels across a wide range of industries and create a new golden age of prosperity. On the other are those who think that technological progress is slowing down and that recent developments – because

they are mainly in the areas of communication – have little impact on productivity and potential economic growth rates.

For the most part, the contributors to this collection believe globalisation or technological innovation – or more likely both – will continue to have a profound impact on the European labour market. Terence Hogarth and Rob Wilson, from the Institute for Employment Research at Warwick University, summarise the likely effect of these trends. Globalisation will mean Europe loses more low-skilled jobs, with a risk that mid-skills jobs are also affected. Technological innovation will also mean less demand for mid-skilled workers and more demand for workers with high-level skills that complement the new technologies. Overall, this is likely to produce a skewed polarisation of the workforce: fewer mid-skilled jobs, lots more high-skilled jobs, and less change in the number of low-skilled jobs.

Jonathan Wadsworth, of Royal Holloway, University of London, points out that these trends are likely to be associated with a continued shift of people into the non-traded service sectors and, if we want to see living standards increase, the challenge will be to raise productivity levels and real wages in these sectors. The importance of future productivity growth is also highlighted by Andries de Jong and Mark ter Veer, of PBL, the Netherlands Environmental Assessment Agency, who produce four scenarios for future developments in the European labour market and show how, as a result of the ageing of the European population, even in the most optimistic scenarios real GDP per capita will only increase if there is a surge in productivity.

In their essays, Matthew Whittaker from the Resolution Foundation and Peter Glover and Hannah Hope from the UK Commission for Employment and Skills look beyond the high-level trends to analyse potential changes in the nature of working life and conditions. Whittaker thinks it is possible that we will see a continuation of recent trends towards increased self-employment and use of non-standard employee contracts, including temporary working. Glover predicts big changes in the way that companies are organised, with less focus on developing internal capabilities among their own workforces and more on bringing together capabilities from a number of different sources, such as consultants and freelancers, in a ‘virtual workplace’. The associated flexibility of employment relationships, he believes, will place the onus on individuals to acquire the skills they need to prosper. As a result of these changes, the labour market of 2025 or 2030 will look very different to that of today. Some of the effects will be positive, but others highlight the importance of tackling low pay and poor worker rights.

A more circumspect tone is adopted by Michael J Handel, of Northeastern University in Boston. While acknowledging the various ways in which technological change can affect the labour market, he

points out the many measurement problems that arise when trying to assess skills demand, supply and mismatch. In particular, he thinks it is important not to generalise from well-publicised cases of dramatic change to the labour market as a whole. Instead, he says, long-run data suggests that change has happened and continues to happen at a gradual pace.

Overall, the message from these essays is that the European labour market is likely to see substantial disruption and change over the next 10 to 15 years, and that it will be less stable and secure for workers. There will be increased polarisation in the demand for skills from employers and a continued shift from manufacturing to services. The likelihood is that aggregate employment will increase, but there is a risk that a combination of labour-saving automation and a poor response by firms, individuals and policymakers could lead to falls in employment and sustained very high levels of unemployment.

Lessons from Germany

In part 2 of this collection, Werner Eichhorst of IZA and Michael Fischer and Jörg Bergstermann of Freidrich Ebert Stiftung look to Germany – the country in Europe where the labour market, at least in terms of unemployment, has been least impacted by recent financial and economic turmoil. Eichhorst recounts the experience of labour market reform in Germany as a case study to show how a country can adapt to the changing shape of its labour market, but can also bring about change through its own actions. He highlights how sometimes change does not turn out as expected: for example, efforts to encourage temporary working as a bridge into permanent employment appear to have led to the creation of pockets of temporary working that have become a permanent feature of the German labour market.

Fischer and Bergstermann pick up this theme of unintended consequences, and suggest that Germany's reforms have resulted, at the margin, in companies adopting a 'low road' strategy of low-value-added, low-paid jobs. They argue that, given low unemployment levels, Germany now needs to focus on improving job quality and reducing the numbers of people in precarious unemployment. At the same time, stronger mechanisms need to be put in place to buffer all workers, not just 'core workers' from the worst effects of temporary fluctuations in demand.

David Brady, Thomas Biegert and Sigurt Vitols from WZB use data from the German Socio-Economic Panel to place recent changes in the German labour market into a longer context. They find some evidence to support the views of Fischer and Bergstermann: the reforms have led to an increase in precarious work, and the downside to increased labour market flexibility has been an increase in part-time work, low-wage employment and wage inequality. But their

strongest finding is a growing 'dualisation' of the German labour market between 'insiders' – who are more likely to be older, male and native – and 'outsiders' – who are more likely to be young, female and migrants. Insiders enjoy the benefits of full-time, permanent jobs with good wages, benefits and protections. Outsiders are more likely to be working part-time and earning low wages. They note that this has happened despite an increase in the average skill level of the German workforce and argue that the lesson for Germany and for the rest of Europe is that supplying skills to a flexible labour market is not a sufficient response to change. More needs to be done to support and encourage firms to use these enhanced skills.

The effects of technological progress on jobs

The authors of the essays in part 3 all share a view that technological innovation will have a major impact on Europe's labour markets over the next decade – some quote the view of Carl Benedikt Frey (one of our authors) and Michael Osborne that up to 45 per cent of jobs in the US (and by implication a similar percentage across Europe) are at risk from digitisation. What comes out of the essays is a clear view that innovation over the next decade will have two characteristics that impact on the labour market: it will reduce the demand for labour in aggregate; and it will increase the demand for high-skilled labour, particularly for those with skills that complement technology.

Although they want to be optimistic about the effect of technological innovation in boosting productivity and creating prosperity for all, the authors worry that the gains will not be widespread. There is no guarantee that enough new jobs will be created to offset the losses that will result from further digitisation. Innovation will further polarise the workforce and increase inequalities of income and wealth, perhaps to the point where they become a drag on overall demand and growth rates. Productivity gains from technological innovation increasingly accrue to the owners of technology and the (relatively few) workers required to operate it, while the vast majority face stagnant real wages at best, unemployment at worst.

Everyone agrees that a big part of the solution is skills development, although there is less agreement about how the balance of responsibility for this this development should be shared out between the state, individuals and employers. Nesta's Stefana Broadbent is among those who argue that it is important to develop the right skills. The new jobs that will be created over the next decade will require people with entrepreneurial, scientific, creative and emotional skills. Steve Bainbridge, of Cedefop, says that EU countries have been improving vocational education and training to make it more relevant to the modern labour market, but there is much more to do – and, in the wake of the financial crisis, less money to do it with. Thor Berger and Carl Benedikt Frey, of Lund

and Oxford University respectively, call for a big increase in digital literacy, but also argue that governments need to help redundant workers retrain to acquire the skills required to get a new job. Sara de la Rica, from FEDEA and the University of the Basque Country, agrees: she points out that the majority of the people who will be in the labour market in 10 years' time are already working and so argues for more skills (re)training for adults.

While accepting that technological change will be beneficial in lifting overall living standards in future, some worry about inequalities that technological innovation will create. Although she is optimistic about the effect of technology, Diane Coyle of Manchester University thinks measures will have to be taken to tackle the inequalities of wealth, income and power that it will create. Alan Manning, from the London School of Economics, comes to a similar conclusion, arguing for more redistributive taxation and measures to spread the ownership of wealth wider. Henning Meyer, also from the LSE, is more pessimistic about economies generating enough new jobs to offset the ones that will be lost, so he focusses on the need for a reallocation of labour among more people and for a public job guarantee for all, while Eurofound's Donald Storrie is also in favour of job-sharing and working-time reductions, and of increased profit-sharing.

The overall message is clear: economists think technological innovation will cause major disruption to the European labour market during the next decade. While, the precise path of change cannot be predicted, the likely results are an increased polarisation of the workforce and a tendency towards greater inequalities of income and wealth. The best way to counter this tendency is by ensuring as many workers as possible have the skills that they will need to thrive in the digital economy. But this might not be enough, and measures might be needed to redistribute work; to ensure a more widespread distribution of the profits from investment in technology; and to shore up the incomes of those who lose out.

How companies are responding to change

A survey of 2,500 employers across five European countries, the results from which are reported in the final essay of this collection, found evidence to support the economists' worries about polarisation. Although the survey was unable to provide any evidence for an increase in high- and low-skilled jobs at the expense of mid-skilled jobs, it did find that there was an increasing polarisation of skills by industry. The proportion of employees required to use mathematical, reading and writing and computer skills is high and increasing in a number of industries – including financial services, accountancy, legal, IT and communications and real estate – while the proportion using mechanical and technical skills is high and increasing in manufacturing and transport. But in the hospitality and

leisure sector and retail sector, the proportion of employees required to use any type of skill is relatively low and increasing at a relatively slow pace. In short, the workforces of some industries are becoming ever more skilled, but other industries appear to have settled for a low-skill equilibrium.

Policymakers should take note of this trend and act to reverse it. While they are right to seek to ensure that there are sufficient skilled workers for those industries that require increasing numbers of them, they should also devote some of their efforts to finding ways of helping and encouraging firms in the low-skill sectors to boost productivity. If they do not do so, inequalities in skills and wages across sectors, and thus across the economy, will grow.

However, the survey was less supportive of the view of some economists that structural change – globalisation and technological innovation in particular – is destroying jobs in Europe. According to the survey, the number of firms that are taking on more employees as a result of new technology is exactly the same as the number that are reducing their workforce for the same reason. And the number of firms that are expanding their workforce as they bring production in-house almost matches the number reducing their workforce as a result of outsourcing. There may be a lot of churn, but the net result is less than clear.

Conclusion

There is little doubt that Europe's labour market will change over the next decade, although the extent of that change – and whether it represents a marked step-up in the historical pace of change – is disputed. There is, however, general agreement that the principal driver of change will be technological innovation, and it is this that creates the greatest uncertainty. New technologies might put at risk existing jobs across a wide range of occupations and industries, or their effect might be less dramatic; they might lead to many new types of job emerging, or they might not. If there is a consensus from the analysis and arguments put forward in this collection, it is that the risk of new technologies leading to an increased polarisation of the workforce – and thus to increased economic inequalities – is greater than the risk that they simply destroy more jobs than they create. It is this problem of polarisation that policymakers should therefore be working with firms to address.

References

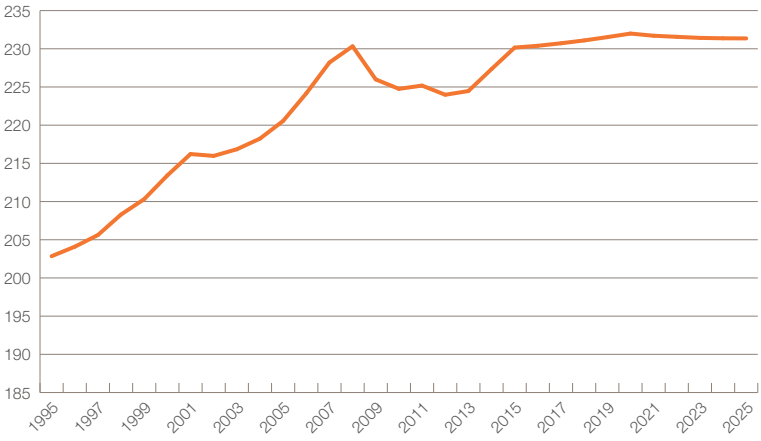
Eurostat (A) 'Unemployment rate by sex and age groups', dataset.
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_m&lang=en

1.1
THE OUTLOOK FOR SKILLS DEMAND AND SUPPLY IN EUROPE

TERENCE HOGARTH AND ROB WILSON
Institute for Employment Research, University of Warwick

The European Union labour market has experienced something of a rollercoaster ride in recent decades. Following a period in the late 1980s and early 1990s when there were concerns about jobless growth, the EU enjoyed a relatively buoyant period for employment in the late 1990s and early 2000s. This came to an abrupt halt after 2007/08, when the magnitude of the financial crisis became fully apparent.

Figure 1.1.1
EU employment, 1995–2025 (millions)



Source: Cedefop, 'Forecasting skill demand and supply' (Cedefop A)
Note: Data is based on all EU countries (EU28).

In the period following the financial crisis, the EU economy has struggled to return to a trend of long-term growth in output and employment anything like that observed in the early 2000s. In fact, the major economies of the eurozone – France, Italy and Germany – have barely avoided falling back into recession in the post-crisis period.

Over the medium term, the outlook for output in the EU is one of subdued growth. This reflects not only conditions in the EU but also the problems that continue to afflict the global economy. Sustained growth in North America remains uncertain, and Japan is still struggling along the long path to recovery from damage done to its economy in the 1990s. With three-quarters of the global economy in the doldrums, the BRIIC countries[1] and other rapidly developing economies are incapable of providing the much-needed stimulus to global growth that would offer some prospect of rapid recovery in the EU.

The subdued outlook for output is likely to be reflected in similarly subdued demand for labour. The aggregate trend could nevertheless mask major shifts in the composition of that demand. Since the mid-1970s, the University of Warwick Institute for Employment Research (IER) has produced projections of skills demand for the UK (focussing on occupational employment).[2] Armed with an indication of how employment by occupation has been likely to change over the next 10 to 15 years, policymakers have felt better able to allocate resources to various education and training programmes. Since the mid-2000s, projections by occupation have also been produced by IER, under the auspices of Cedefop, for each member state of the EU and for the EU28 in aggregate.[3]

These projections are part of the overall information set available to all those in the labour market, including individuals making their initial entry into the labour market as well as those already in it. This, in part, reflects the desire of policymakers in member states to make their education and training systems more responsive to the demand side, with an aim that these systems should be demand-led. By making information about the future demand for skills available, they enable those who are considering investing in education and training to make better-informed decisions.

As well as being a source of labour market information, the underlying time series on which these projections are based allow us to look at how the EU labour market has developed over recent years, and how it will continue to develop over the medium term. In this essay, then, we focus on how demand for skills has changed and will continue to change, and highlight potential problems ahead.

1 Brazil, Russia, India, Indonesia, and China.

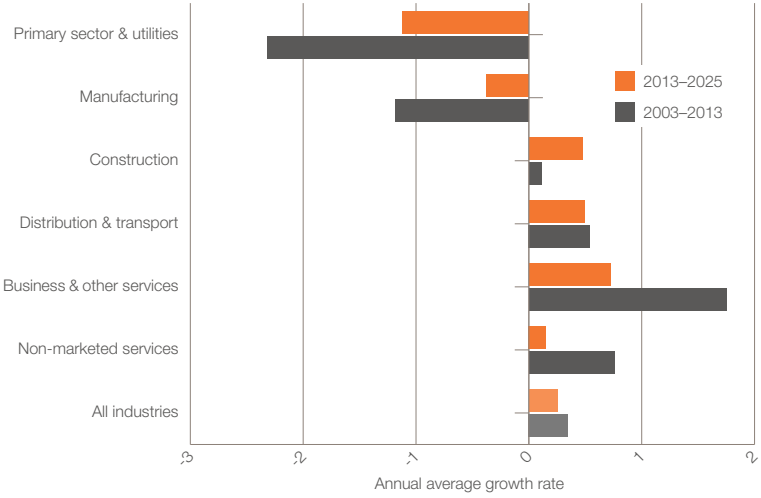
2 For the latest set of UK projections, see Wilson et al 2014.

3 For EU aggregate projections of skill demand, see http://www.cedefop.europa.eu/en/events-and-projects/projects/forecasting-skill-demand-and-supply/publications

A recent history of skills demand

Since even before the financial crisis, the EU economy has been facing a number of challenges. One of the principal among these is maintaining the EU's share of the high-value-added segment of the global market. In previous decades, with increasing trade between the global east and west, the EU was able to transfer much of its production concentrated in low-value-added activities to other countries, such as China. Along with increasing efficiency gains in the manufacturing sector, this resulted in a shift towards service-sector employment in the EU (see figure 1.1.2). The EU's competitive advantage in the global market has had to be in designing and developing new products that would eventually be manufactured in the far east or Indian subcontinent. That is, its advantage is in the so-called 'knowledge economy', which calls for high-level skills, ingenuity, and the know-how required to create the next generation of products and services. If the EU is to continue to compete successfully with the United States, Japan and China in the knowledge stakes, it needs to further increase the quality of its human capital – the skills, knowledge and accumulated experience of its workforce.

Figure 1.1.2
Trends in EU employment by sector, 2003–2025 (actual and projected)

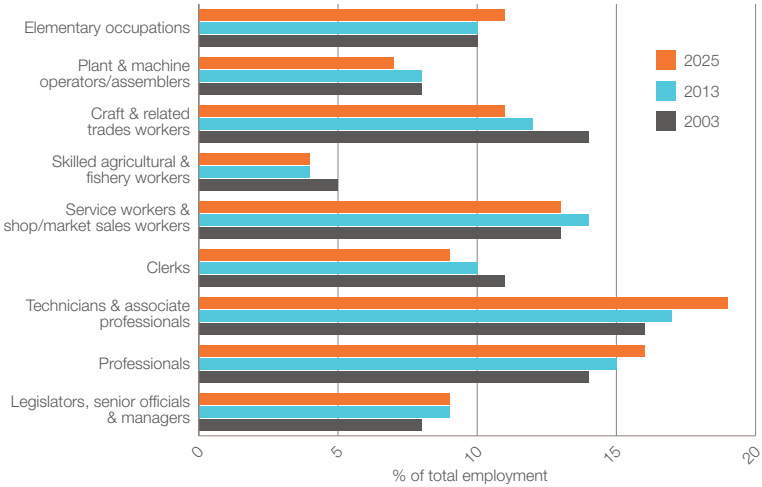


Source: Cedefop, 'Forecasting skill demand and supply' (Cedefop A)

In most EU member states, much of the shift from manufacturing to service-sector employment took place during the 1970s and

1980s, substantially altering the occupational structure of their labour markets. This pattern of change is continuing, as figure 1.1.2 indicates, albeit at a slower pace. The consequence has been a shift towards higher-level, white-collar occupations and away from traditional craft and related blue-collar work. The share of employment concentrated in higher-level occupations is increasing, but there are also some increases in lower-level occupations, creating a phenomenon known as 'polarisation', leaving fewer and fewer jobs and workers in the middle ranks on the occupational distribution, as illustrated in figure 1.1.3.

Figure 1.1.3
Proportion of EU employment by occupational category, 2003–2025 (actual and projected)



Source: Cedefop, 'Forecasting skill demand and supply' (Cedefop A)

Task-based technical change (TBTC), which has replaced many intermediate-level jobs by processes of automation, has also had a profound impact on the occupational structure. TBTC does not affect jobs that require a relatively high degree of cognitive ability and task discretion – in other words, jobs in the upper section of the occupational hierarchy (McIntosh 2013). Nor does it affect jobs where there is a high level of personal service required – such as in hospitality and retailing – and therefore many jobs at the lower end of the occupational hierarchy are also unaffected. Consequently, there has been a hollowing-out of the skills structure, with an increasing share of employment in both relatively high and relatively low-skilled jobs.

It is becoming apparent, however, that even higher-skilled jobs are not necessarily immune to the effects of TBTC. Do-it-yourself kits, for instance, potentially substitute for the roles played by lawyers in conveyancing, divorces and making wills. And intelligent, automated systems have some capacity to squeeze out jobs at the bottom of the occupational hierarchy too.

How investments in skills have responded to the new economic conditions

These three factors – subdued economic growth, the tactical decision of some firms to move production to countries with lower labour costs, and ongoing technical change – mean that finding and keeping a job in the European labour market has become a more daunting task for its citizens. If the EU is to retain its share of the high-value-added global market, it needs to ensure that it has the human capital to undertake these activities. This means being better than the competition, in Japan, the United States or elsewhere. To this end, member states have invested substantially in their education and training systems, to raise levels of educational attainment and overall levels of human capital. Educational attainment levels across the EU have been increasing, with the share of people entering tertiary-level education steadily increasing towards the EU target of 40 per cent (Cedefop 2013). Young people have been willing to spend longer in education and training, inspired in part by the difficulties they have experienced in entering the labour market at an appropriate level. By investing in this way, they are attempting to improve their prospects of entering a relatively high-skilled and well-paid occupation.

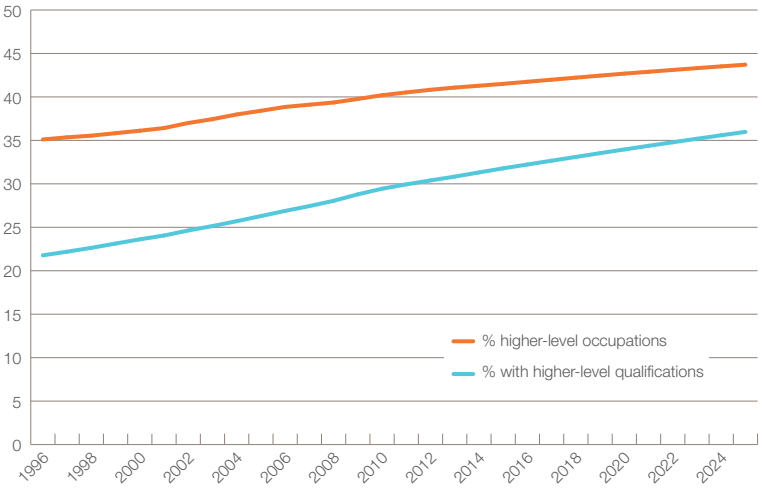
But this may not be enough. Changes are also needed on the demand side of the labour market to ensure that the kinds of jobs these young people aspire to are created. This in turn demands innovation and entrepreneurial drive.

Figure 1.1.4 shows that growth in the proportion of people who are qualified at a relatively high level (a tertiary level of educational attainment) has outstripped growth in employment at that level. This is a long-established trend, and it raises concerns about the potential mismatch of skills in the economy: the percentage of people who are acquiring high-level qualifications may be outstripping actual demand for people at that level.

And this has a knock-on effect: even among lower-level occupations there is an increasing share of people who are relatively highly qualified for those jobs. There are, for example, an increasing number of highly qualified people in elementary occupations which typically do not require such a level of formal qualifications. Well-qualified people are likely to be better able to find, secure and retain jobs,

even if the qualifications they hold are not required – but, in the process, they may be further 'bumping down' those at the next level of educational attainment.

Figure 1.1.4
High-level skills vs high-skilled employment, EU, 1996–2025 (% of total employment, actual and projected)



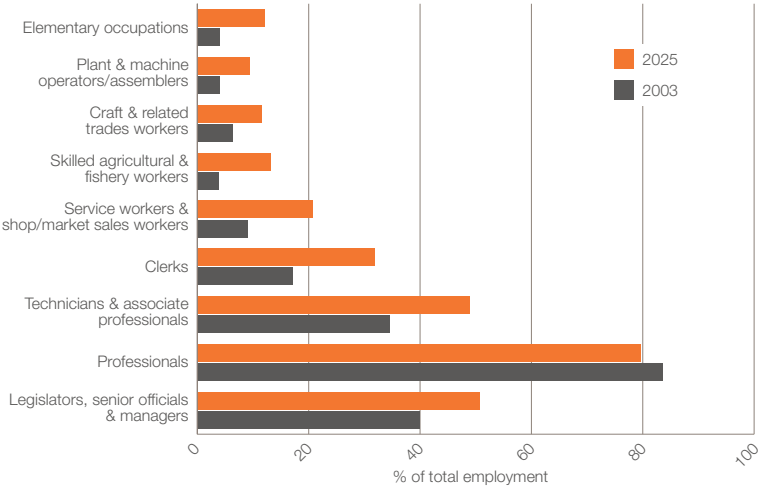
Source: Cedefop, 'Forecasting skill demand and supply' (Cedefop A)

Education and skills are in many respects merit goods: they are like good health, you can never have too much of them. There is a danger, nevertheless, that ratcheting up skill levels does not generate the returns expected, despite producing a higher level of skills supply. Instead, all that happens is that those with slightly lower-level skills are displaced by people with higher-level ones, with no discernible impact on aggregate economic performance. For an individual, of course, it is still rational to invest in education and skills, to avoid this displacement down the occupational ladder. For the economy as a whole, however, this constitutes a suboptimal allocation of resources.

An economy can never invest too much in the education of its population, but it needs to ensure that the skills it produces generate a return to those investing in them. Today, however, there are concerns that skill surpluses are emerging in the EU.

Figure 1.1.5, for example, shows the extent to which people with relatively high-level qualifications are working, increasingly, in low-skilled jobs. This does not necessarily demonstrate that skill surpluses exist – it may, for instance, simply reflect the fact that keeping and progressing within a job is becoming more difficult. But the trend over time is towards more people with high skills working in low-skilled jobs.

Figure 1.1.5
Proportion of high-skilled workers by occupational category, EU, 2003 and 2025 (actual and projected)



Source: Cedefop, 'Forecasting skill demand and supply' (Cedefop A)
Note: 'High-skilled' here means people who attained tertiary level education.

Making smarter skills investments

Any individual making a personal investment in education and skills needs information about the likely return they can expect, to ensure that such investments support their career ambitions, just as governments and education systems need information to inform the courses provided. On a national scale, a lack of information about the dynamics of the labour market and what it values economically can result in mismatches occurring: too few of some skills, too many of others. Projections of demand for skills of the kind produced by IER for Cedefop, and used in this essay, begin to provide that information, indicating where there is likely to be the greatest demand for skills

in the future and the educational profile of people who work in those jobs. The EU is still in the relatively early stages of developing a sophisticated labour market information system comparable to that of O*NET in the US, which is able to provide detailed information about the future demand for jobs at a highly disaggregated level, the qualifications and skills required to enter a specific occupation, and the wage rate likely to be obtained.[4] But a substantial start has been made, and this should both help individuals to make informed decisions about investing in their own education and skills, and enable policymakers to prevent costly skills mismatches from opening up in their national labour markets.

References

Cedefop (A) 'Forecasting skill demand and supply', database. http://www.cedefop.europa.eu/en/events-and-projects/projects/forecasting-skill-demand-and-supply/skills-forecasts-main-results

Cedefop (2013) *On the Way to 2020 – Data for vocational education and training policies: indicator overviews*, research paper 33, Publications Office of the European Union. www.cedefop.europa.eu/files/5533_en.pdf

McIntosh S (2013) *Hollowing out and the future of the labour market,* Department for Business, Innovation and Skills. https://www.gov.uk/government/publications/labour-market-change-and-the-future-of-middle-ranking-jobs

Wilson RA, Beaven R, Hay G, May-Gillings M and Stevens J (2014) *Working Futures 2012–2022: Main Report*, UK Commission for Employment and Skills. https://www.gov.uk/government/publications/working-futures-2012-to-2022

4 See http://www.onetonline.org/

1.2
EUROPEAN LABOUR MARKETS IN THE COMING DECADE

JONATHAN WADSWORTH
Royal Holloway College

No self-respecting economist should try to predict the future. Unforeseen events have a habit of coming along to upset the best-made forecasts. Economic fashions are also rather capricious. Today, no one sees Ireland as the economic success story it was held up to be 10 years ago. Germany, Sweden, Japan and the United States, along with the UK, have each in their turn been held up as an economic paragon, only to subsequently fall from grace. No doubt a new champion will emerge from the present downturn and recovery. This experience counsels us to exercise care when looking for evidence of what works, or when setting out policy prescriptions.

Furthermore, before we can gauge future success, we need a set of guidelines for how that success will be measured, and it is not clear that we are even at that point. Labour market performance should be judged against many different criteria; success (or failure) needs to be determined by more than one performance indicator. This means moving away from a reliance on the unemployment rate, important though that is, and towards alternative, complementary measures of spare labour capacity – including the employment rate, but also measures of hours worked and wage growth.

The distribution around average measures also matters. Generally we would favour, for example, an economy that manages to combine a low unemployment rate with low dispersion around the average, whether the disaggregation is by skill, region or any other metric. The duration of joblessness is also a key measure of performance, and other measures of concentration, like the workless household rate or measures of wage inequality, will be useful complementary indicators. The dynamics of the labour market also matter, yet too often they are overlooked. The speed at which jobless individuals find work or the rate of job loss are important. For a given level of wage inequality in an economy, the issue becomes much more important if individuals towards the bottom of the distribution remain at the same level over time than if they are able to move up.

Labour demand

Labour demand is a derived demand: labour is demanded to produce an output and is not employed as an end in itself. This means that without output growth, it is much more difficult to maintain employment at a high level. Okun's law – which states that 2 per cent growth is needed before the unemployment rate comes down – has held, broadly, for the last 50 years in most western European countries, and this is unlikely to change much in the near future. Moreover, growth needs to be measured on a per-capita or per-hour-worked basis: it is relatively easy to generate growth when the population is rising, but much harder to ensure that this generates rising wealth for all, as the UK has recently discovered.

The UK has, however, experienced a surprisingly good employment record in recent years. There has been a growing understanding here that wages rather than employment took the strain of the labour market shock that occurred after the 2007/08 crisis. This was clearly true: UK employment probably fell by 1 million less than expected because of an unprecedented fall in real wages.[1] However, it still took growth of more than 2 per cent for the unemployment rate to start falling. Steady growth seems to be necessary for continued good performance in the labour market.

While notions of a common or universal level of performance or policy response probably do not hold, all economies are subject, to a degree, to common international trends, such as continuing innovation in information technology, rising international trade, and increasing movement of capital and labour. How different economies respond to these pressures is likely to be of interest to policymakers. Alfred Marshall's laws of labour demand, first formulated over 120 years ago, are still likely to be relevant in this regard.[2]

Innovations in technology are likely to continue to reduce the need for labour to do routine work. While innovation may also generate the need for complementary skilled labour, the former is likely to be the larger effect. This is not to say that labour markets will not absorb the impact; technology has been making inroads into labour for over 200 years and aggregate employment has largely kept on track. But it is likely that the nature of work will continue to evolve in the face of technological innovation, and that some people will lose out. Policy can help here by facilitating alternatives in areas that are suffering from industrial decline.

Employees in tradable sectors are also likely to be at greater risk of competition raised by capital moving to countries where labour

1 One million jobs is roughly equivalent to a 10 per cent fall in the UK wage bill, assuming employment of 30 million and average wages of £25,000 a year.

2 These define the sensitivity of labour demand to a range of factors and were first set out in Marshall's *Principles of Economics* in 1890, but can be found in any standard economics textbook.

costs are lower. The harder it is to substitute employees' labour and the lower their share of total production costs, the less vulnerable they will be. In the future, then, most Europeans are likely to be employed in the non-tradable service sector. In this case, the issue becomes how to ensure that revenues and hence wages in these sectors are sufficiently high that employees are able to participate in the economy. If there are economic rents to be had in a given sector, it will be easier to pay higher wages, although this means in turn that customers may have to pay more for certain services. Several professions – such as finance and insurance – have managed to operate in this way, so it can be done. Nonetheless, whether capital will concede some ground to labour in order to bring this about, and if so how, are important issues going forward.

Labour supply

There are essentially two elements to labour supply: the extensive and intensive margins. The extensive margin concerns numbers of people. Over the past 50 years or so, the potential labour supply of most European economies has increased as the result of increased participation by women and, to a lesser extent, by workers beyond the statutory retirement age, as well as, in some countries, because of immigration. These factors are offset to a small degree by the expansion of tertiary education, which keeps younger people out of the labour market for longer.[3]

The scope for further expansion of the labour supply by enabling increased participation of women is probably not as great now as it once was, at least in northern and western Europe. Over the next decade the share of men and women in the workforce is likely to approach parity in many European countries[4]. Instead, it is more likely that rising participation will come from the other sources, subject to demand. Earlier downturns have seen many older workers moved out of the labour market, few of whom were incentivised or even able, because of lack of opportunities, to return. Now, however, older workers are, on average, healthier than their counterparts from earlier decades, which should aid their return to work. Concerns about possible conflicts between older and younger generations are unlikely to be realised – indeed, this is one aspect of the lump of labour fallacy. If the economy expands there is likely to be room for all, and older and younger workers do not appear to be particularly close substitutes, and so unlikely to be in direct competition.

3 See OECD Employment Outlook for details on these trends. Of course, students can work while studying. In the UK, while the share of youth engaged in tertiary education continues to increase, the proportion of full-time students who also work seems to have been falling over the last 10 years see for example http://www.ons.gov.uk/ons/dcp171776_257979.pdf

4 See OECD Employment Outlook

The second primary source of labour supply is immigration. Immigration is likely to remain a contentious issue in Europe for some years. As long as there are differences in economic performance there will always be pressures on individuals to move toward economies that are doing well and away from those that are doing less well. Economies that are doing well seem, so far, to have been able to absorb rising inflows of individuals, at least economically if not politically. The consequences for the sending countries need not be bad, concerns about 'brain drain' aside. Any shortages caused by loss of labour should help to drive up wages among those who remain (the reserve army of labour effect in reverse). The question here, then, is how quickly this will happen.

The intensive margin of labour supply concerns how long people work and how productive they are. This, in turn, partly depends on how skilled they are. Productivity growth is generally regarded as good because this is one, though not the only, important driver of growth – and with it labour demand. Skilled workers are, on balance, more productive than those who are less skilled, so a highly educated/trained workforce in both academic and vocational skills is likely to continue to be needed, if productivity growth is the assumed objective. Over the next decade, for the first time, the majority of the workforce in many European countries will be skilled to tertiary education level. However, forecasting future specific skill requirements is difficult, so policymakers may be better ensuring the provision of general skills training in universities and technical schools to produce a high-skilled workforce.

Trends in hours worked are influenced by the extent of part-time working and overtime, and fluctuations in the standard length of the working week or year. The issue of job security and temporary work is also a perennial source of concern. Nonetheless, although there have been increases in some of these atypical forms of working in some countries since the financial crisis, these are can be seen as cyclical fluctuations. Taking a longer view and looking through the economic cycle, they have not grown substantially over the last 20 years – although this needs to be monitored and if things change then policymakers need to address any disadvantages for affected workers. For many workers, the best protection from such non-standard forms of work is an economy operating at near capacity. How resistant capital is to the consequences of full employment, notably rising labour costs, is an important issue to consider.

The more things change…

Across Europe, many different economic systems coexist, and economies, firms and workers are experiencing a great variety of labour market outcomes. Consider just one commonly used indicator: the harmonised national unemployment rate. The mean for

the EU is currently around 10 per cent, but this conceals a spread of 21 percentage points, from 5 per cent in Denmark to 26 per cent in Greece (Eurostat A). This variability makes common policy prescriptions across Europe difficult – and indeed unadvisable. One real debate still to be had is whether minimal regulation and limited institutions are the key to economic success, or whether targeted, costed and evaluated interventions can help to alleviate labour market failures. The key to resolving this debate is to compare outcomes after policy interventions with an explicit counterfactual case. This is not easy, because it is hard to disentangle the effects of policy from the effects of the many other factors that determine labour market outcomes, but researchers are applying new evauation techniques to the problem and their results are eagerly anticipated. However, it is debateable whether any country could rapidly move from one system to another, dismantling or establishing institutions that typically take decades to set up. Incremental change is likely to be the best that can be expected.

While technology, stability and growth have improved the lives of most Europeans significantly over the last century, many basic features of the labour market of the 1930s still exist now, and are likely to continue to do so. Therefore, we can say with some confidence that future patterns of unemployment (and employment) are likely to be based on the same interplay of skill-level, age and location that have determined rates of joblessness for decades.[5] Younger, less skilled workers in peripheral regions of any country are much less likely to be in work, and this is likely to remain so. On the flipside, workers in non-tradable service sectors that can generate rents are likely to be more secure. It is hard for policymakers and others to anticipate what may or may not happen over the medium to long term, and so it is probably better for them to ensure that the right supporting infrastructure and institutions are in place, alongside a willingness to act in the face of shocks. Policymakers need to base their judgments around a broader range of measures of performance, but without per-capita growth, any improvement or adjustment to the inevitable pressures pushing against less-skilled labour will be much more difficult to achieve.

References

Eurostat (A) 'Unemployment rate by sex and age groups', dataset. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_m&lang=en

5 For example, the correlation between unemployment rates in 1992 and in 2004 in 405 UK local labour markets in 1992 and 2014 was 0.87, indicating that the same areas have high or low unemployment now as did so 22 years ago. Author's calculation based on ONS 'Labour Market Statistics database'. For UK data going much further back in time see for example: http://discover.ukdataservice.ac.uk/catalogue?sn=3710

1.3
PROJECTING LABOUR PRODUCTIVITY

ANDRIES DE JONG AND MARK TER VEER
PBL Netherlands Environmental Assessment Agency

The size and shape of the labour force is determined by a combination of demographic trends within the working-age population and trends in labour force participation. The EU labour force expanded steadily over the second half of the last century and, beneath this rising trend, there were some impressive changes in participation. For example, since 1960, male labour force participation has been decreasing all over Europe, while the opposite has been true for female participation.

Looking ahead, in order to anticipate potential trajectories for the labour force, we have formulated four policy scenarios for labour force participation. Participation refers to the degree to which people are involved in the labour force, whether they have a job or are actively looking for work. In general, fluctuations in the participation rate are caused by changes in participation levels among three broad categories of non-working people: young people in education and initial training, older retired or disabled persons, and women who have left the labour market to care for their children. So our policy scenarios have been formulated principally in terms of changes in these three categories, under the influence of better or worse economic conditions and policymakers' preference (or not) for promoting social and regional cohesion.

Four scenarios for future labour force participation in Europe

As part of the ESPON project DEMIFER – Demographic and Migratory Flows affecting European Regions and City (2010) – four scenarios for the future shape of the labour force have been developed.

Scenario 1: Growing Social Europe
In this first scenario, we assume a combination of high economic growth and policies oriented towards social and regional cohesion. This leads to an increase in the economic activity rate of people

of all working ages, although the rate of change varies between the sexes and age-groups. The educational level of the population increases, and more and more young people combine education with employment, helped by an increase in part-time jobs. The flourishing economy stimulates employers to create opportunities for women to combine work and raising children, particularly in a growing service sector. Women with young children are enabled to enter the labour force through measures such as extended childcare facilities and flexible jobs, particularly in the government service sector. As a result, other countries converge on the high activity rates for women and young people already witnessed in the Scandinavian countries.

In this scenario, measures are also taken to postpone retirement, such as encouraging more flexible working arrangements. This leads to a considerable increase in the participation of both men and women aged 50 and over. This scenario is further characterised by policies stimulating regional cohesion.[1] In the long run, this leads to similar patterns in labour force participation rates across European countries.

Scenario 2: Expanding Market Europe
In this scenario, the economy flourishes and economic circumstances are even better than in the Growing Social Europe scenario. A market philosophy dominates the political climate. Increasing economic activity and lower labour taxation lead to a strong increase in the demand for labour, and the educational level of citizens increases. However, post-compulsory education is seen as a private investment and is not well financed from the public purse. So, in order to finance their education, young people have to combine school with (part-time) employment. Under this scenario, part-time jobs are abundantly available, specifically created for students, in order to capitalise on the high supply of labour.

For other groups, such as elderly people and women with young children, entry into the labour market becomes easier. Employers attract women by creating flexible jobs that the combination of motherhood with outside employment, and a growing private service sector also offers additional opportunities for women to find suitable work. In this scenario, unlike in scenario 1, the market philosophy leads to a divergence in regional economic performance, reflecting the absence of policy measures to counter the trend for economic growth and labour participation to be much higher in the stronger economic regions than in weaker regions.

1 For example, skills and infrastructure policies to support inward investment in regions suffering most from the loss of ‘traditional’ jobs.

Scenario 3: Limited Social Europe

In the Limited Social Europe scenario, we assume that policymakers strive to attain social and regional cohesion, as in the first scenario, but economic prospects are gloomy. Households have trouble coping with rising costs as the financial effects of climate change become visible and energy prices increase. The demand for labour falls, causing a severe drop in labour force participation, as conditions discourage people from continuing to seek work. Opportunities for young people to combine work and school attendance fall as a result of fierce competition in a tight labour market. Young people tend to stay longer in full-time education programmes, in order to enhance career opportunities. For women with young children, the prospects of finding paid employment are not good, partly due to a scarcity of part-time jobs. Financial problems lead to dramatic cutbacks in the service sector. A preference for early retirement prevails, as governments give priority to the absorption of young people into the labour market, reducing opportunities for older workers to remain or return.

Although economic stagnation is widespread, it is more severe in poorer than richer regions. Especially in economically weak regions, the demand for labour is low, unemployment is high and labour force participation declines. However, due to policies that aim for regional cohesion, the negative effects, especially for weaker regions, may be softened by jobs created by government, specifically for the long-term unemployed. As a result, disparities between regions largely remain unchanged from their current levels.

Scenario 4: Challenged Market Europe

In this final scenario, economic growth plummets and severe environmental problems arise. This leads to a restructuring of the economy; weaker firms do not manage to survive, while larger and stronger firms dominate the economic landscape. The lack of jobs induces young people to prolong their educational careers, leading to a decline in their labour force participation. Policies are not directed at creating opportunities for women to combine work with care for children. Increasing unemployment and worsening conditions in the labour market discourage both men and women from actively seeking work. Although policies do not promote early retirement, employers are happy for older employees to stop working, because their productivity levels are perceived to be lower than those of younger people, and so the participation rate of this older age-group falls.

In this scenario, the poorly performing regions are expected to suffer the most from low economic growth. In these areas, participation drops considerably, while relatively little change occurs in the economically stronger regions. Thus, there is a continued increase in regional divergence.

The size and shape of Europe's future labour force

For each of the four policy scenarios, we estimate the future size of the labour force in line with projections of scenario-specific working age-group populations and labour force participation rates. In recent decades, the labour force has grown continuously, but only in the Expanding Market Europe scenario (scenario 2) is the labour force expected to be larger in 2050 than it was in 2005 – and even this growth is modest, by only 5 per cent. In this scenario, higher participation rates are combined with a more or less stable working-age population. By contrast, in the Growing Social Europe scenario (1), rising labour force participation rates are offset by contraction in the size of the labour force.

The two other policy scenarios sketch a future characterised by a shrinking labour force. In the Challenged Market Europe scenario (4), this downturn is limited to a 10 per cent fall from 2005 levels. As the pattern of participation rates largely resembles the current pattern, the decrease in labour force numbers is caused primarily by a shrinking population. In the Limited Social Europe scenario (3), the contraction of the labour force is very large: a combination of declining participation rates and negative population growth is expected to cause a decline of 20 per cent in workforce numbers by 2050.

In recent decades, the gender composition of the labour force has gradually changed, as the share of women has increased. In the Expanding Market Europe scenario, this gradual feminisation of the labour force is assumed to continue into the future, while in the Growing Social Europe scenario, the gender composition is taken to be unchanged from present. However, both the Limited Social Europe and Challenged Market Europe scenarios predict a decline in the share of women in the labour force, because the poor economic performance of these two scenarios impacts more heavily on the labour-intensive service sectors, which employ more women than other industrial sectors.

Overall future trends within the European labour force are more or less mirrored at a national level, although growth paths show some differences between nations. In the Expanding Market Europe scenario, about half of the countries experience a growing labour force up to 2050, while the other half have to cope with a shrinking labour force, mainly as a result of a fall in birth rates that already makes a shrinking population inevitable. In the other three scenarios, most countries will be confronted with more or less severe decreases in labour force numbers. This is particularly dramatic in the Limited Social Europe scenario, according to which almost all countries will face a declining labour force, and for nearly half this decline will amount to almost 40 per cent. And this negative trend is even more severe for women than for men.

In general, labour force prospects are considerably better in western and northern Europe, while eastern European nations in particular face setbacks. Germany, however, is an exception to this rule: even under the favourable conditions of the Expanding Market Europe scenario, it is expected to see a 20 per cent decline in the size of its labour force between 2005 and 2050. Under the poor conditions of the Limited Social Europe scenario, this decline could be as large as 35 per cent. This outcome is largely due to a shrinking population, caused by ongoing low fertility rates – the average number of children per woman in Germany is just 1.4, well short of the 2.1 needed to replace the current population. By contrast, in the UK, the prospects for a growing labour force are positive under all scenarios, with projected growth figures ranging between 5 per cent and 50 per cent for the 2005–2050 period.

Projected declines in the labour force could be mitigated by increased migration from outside Europe. Already, policymakers have implemented measures to utilise immigration from outside Europe as a means of filling foreseen gaps in the labour force. In several countries in southern Europe in particular, the demand for labour migrants may become urgent, as these countries are more likely to experience a shrinking labour force yet their economies are characterised by a high proportion of labour-intensive jobs.

The impact of labour productivity on growth and future prosperity

If growth in the size of the labour force slackens or even becomes negative, productivity growth will become an even more important driver of economic growth. It may be assumed that, at unchanging labour productivity levels, GDP per active person will remain constant. According to each of the four scenarios, this would lead to a big drop in prosperity in the EU countries by 2050, ranging from a decrease in GDP per capita of about 10 per cent in the Expanding Market Europe scenario to about 20 per cent in the Limited Social Europe scenario. This decrease can be attributed to the ageing of the population, leading to a larger share of inactive people, in combination with a substantially shrinking labour force under the two low-growth scenarios. It is clear, therefore, that raising labour productivity levels is a necessary step to counter the risk of falling prosperity.

In order to illustrate the effect of increasing labour productivity, let us assume for each of our four scenarios that GDP per active person is 20 per cent higher in 2050 than it was in 2005. It must be stressed that these calculations are rather speculative, as they do not involve explicit assumptions on changes in the sectoral composition of the economy (and regional disparities), improvements in technology, substitution of labour by capital, or changes in the gender and age

composition of the labour force. In three of the four scenarios, GDP per capita will rise somewhat between 2005 and 2050, with growth figures of around 5 per cent. However, in the Limited Social Europe scenario, this increase in productivity is still not enough to prevent a fall in prosperity, and GDP per capita will be 5 per cent less.

As these figures illustrate, there is an urgent need to ensure growth in labour productivity across Europe. Across all four policy scenarios, prosperity is expected to fall markedly in the future if labour productivity does not improve. Therefore, policies aimed at increasing the size of the labour force should be supplemented by those that aim to raise labour productivity. In line with the Lisbon Strategy and Europe 2020, this should include investment in human capital, with a focus on new skills.

1.4
WHAT DO CURRENT TRENDS TELL US ABOUT THE BRITISH LABOUR MARKET OF TOMORROW?

MATTHEW WHITTAKER
Resolution Foundation

Typically the best way of predicting what the weather will do tomorrow is to assume that it will be the same as today. This doesn't mean the outlook never alters; simply that change tends to be grounded in the present. Likewise, when considering the labour market of tomorrow, it makes sense to look at the trends already at work. Of course, the recent economic climate has been stormy, and not all of today's conditions will persist over time – but some will, and not necessarily just those that were already in evidence before the recent downturn. It is often the case that the labour market goes through a step change over the course of a downturn and recovery, which shapes its structure during a subsequent phase of stable economic expansion.

With that in mind, this essay assesses the prospects for the continuation in or reversal of five recent trends in the UK – some clearly long-term and structural, others more recent and not yet sure to remain as the economy recovers – and considers the implications associated with each of these. Although the focus is on the UK, each of these trends is replicated in other European countries, so the lessons to be learned are broad.

Increased labour supply

Underpinning the surprising resilience of employment since 2008, through the course of a major economic crisis, has been a significant increase in the number of people declaring themselves economically active. This is all the more unexpected given that the assumption had been that ageing in the population would reduce labour supply over this period regardless. In part, this increase in supply is likely to reflect an increased need to work associated with the heightened pressures on household finances in recent years, and so it may dissipate over the coming years as incomes start to recover.

Yet, while this driver may prove temporary, there are several other factors that point to the possibility of a permanent increase in supply. Removal of the default retirement age and initial steps towards equalising the state pension age for women and men by 2018 have boosted the supply of older female workers in particular, reinforcing a trend that was in train before the financial crisis. With the pension age for men and women set to be lifted again in coming years and interest rates projected to remain low (with implications for the adequacy of pension returns), we might expect further expansion of supply among older age-groups. At the same time, welfare reforms appear to have permanently boosted supply through a combination of incentives and conditionality.

The recent increase in supply has, of course, been associated with falling real wage levels. As such, the relationship between unemployment and pay appears to have shifted, with the Bank of England reducing its estimate of the UK non-accelerating inflation rate of unemployment (NAIRU) to around 5.5 per cent (BoE 2014). It may be lower still. Tomorrow's labour market may be one in which the unemployment rate falls towards levels last seen in Britain in the early 1970s while, at the same time, the employment rate rises above the highs of the pre-crash 2000s.

The long-term drift towards a service sector economy

Recent evidence of 'reshoring'[1] – whereby firms return production processes to the UK – offers a flicker of hope that, after decades of decline, manufacturing's share of economic output may well rise in the coming decade. However, corresponding employment growth in manufacturing appears unlikely to keep pace with that projected in the big service sectors – business, finance, retail and hospitality – and so its share of overall employment will continue to decline. Crucially, perpetuation of these existing trends would have implications for how the proceeds of future economic growth will be distributed to workers.

Manufacturing is characterised by a relatively high 'labour share' – the proportion of economic gains that flow to the workforce rather than the owners of production. In contrast, business and – more acutely – finance have much lower labour shares, with the focus instead being on the distribution of profits to shareholders. The changing shape of our economy in recent decades has therefore been associated with some rebalancing of gains away from workers and towards owners (although this pattern has been less marked in the UK than in other advanced economies). The contraction of manufacturing employment and expansion of services matters also for the distribution of wages across the workforce. It brings with it a relative fall in the share of

1 See for example: https://www.gov.uk/government/publications/businesses-are-coming-back/businesses-are-coming-back

mid-pay (manufacturing) jobs and an increase in the share of higher-pay (finance and business) and lower-pay (retail and hospitality services) ones. And with manufacturing providing more regularly spaced career rungs than other sectors, its decline is also associated with an overall reduction in pay progression opportunities.

Taken together, these movements help to explain why employees in the bottom half of the earnings distribution saw their share of each £1 of value generated in the UK economy fall by one-quarter between 1997 and the start of the financial crisis in 2007 – from 16p to 12p (Whittaker and Savage 2011). In the absence of a concerted effort towards industrial rebalancing, we might expect to see this trend continue as the economy normalises post-crisis.

The hollowing out of the labour force

Such industrial polarisation is of course mirrored in the 'hollowing out' of occupations.2 The UK, in common with many other European economies, has experienced the fastest employment growth among the highest- and lowest-skilled jobs in recent decades, with the share of mid-skilled jobs correspondingly falling. Although the pattern is well-established over the longer term, the UK trend appears more nuanced than is sometimes thought. Research has suggested that polarisation was less evident in the immediate pre-crisis years of the 2000s, with the employment share of higher-skilled occupations increasing sharply alongside a corresponding fall in the bottom 70 per cent of occupations (Pessoa and Plunkett 2013).

However, tentative findings suggest a new phase of polarisation since 2008. Between 2008 and 2012, employment growth was clearly strongest among low- and high-skilled occupations, while the employment share fell among mid-skilled jobs (ibid). It remains to be seen whether further hollowing out occurs as economic recovery builds but, unless the recent shift is reversed, tomorrow's labour market will remain more polarised than the one that existed immediately prior to the crisis.

The rise of non-standard employee contracts

Some economists have argued that industrial and occupational polarisation is driving the development of a 'two-tier' workforce. By way of support, they point to the apparent growth of less secure forms of work in recent times. In reality, the picture is mixed.

The number of temporary workers has increased significantly, totalling almost 1.7 million in September–November 2014 (ONS 2015).

2 See Hogarth and Wilson in this volume for a European picture of polarisation.

However, this trend appears to be directly associated with the economic downturn. Numbers fell steadily in the pre-crisis years, and subsequent increases were associated with a rise in the proportion of people who stated that they were working on a temporary basis *only because* they were unable to find a permanent job. However, despite strong improvements in the labour market in the last 12 months, the share of employees on temporary contracts has continued to increase. With the proportion of 'involuntarily temps' simultaneously falling, there is some suggestion that the rise in temporary working will persist for some time yet.

Alongside temporary work, much attention in recent years has focussed on the use of so-called 'zero-hours contracts'. Although figures are difficult to pin down, the ONS estimates that some 1.4 million 'contracts without guaranteed hours' were in place at the start of 2014.[3] While no consistent data exists for earlier periods, alternative measures suggest that numbers have increased sharply in a short space of time. As with temporary working, it is likely that part of this increase is cyclical. However, more than one in 10 businesses are believed to have made use of such contracts, rising to nearly half of large employers. And, according to one survey for the Chartered Institute of Personnel and Development (CIPD), nearly half of those employers using zero-hours contracts view them as a long-term feature of their workforce strategy.[4]

So, while it's too early to draw any definitive conclusions, there are at least tentative signs to suggest that some part of the recent increase in non-standard employee contracts is here to stay.

The sharp increase in self-employment

The other major trend of recent years has been the sharp rise in self-employment, with increases in such workers accounting for around two-thirds of jobs growth since 2008. They now account for around one in seven of the British workforce (ONS 2015). Again, there is evidence to suggest that some of this increase is cyclical. One-quarter of those becoming self-employed in the post-crisis years did so due to a lack of better work alternatives (compared with just 10 per cent among the pre-crisis self-employed). And regional comparisons point to a relationship (albeit weak) between self-employment and rising unemployment. Having risen sharply in recent years, the number of self-employed levelled off in 2014 as the economic recovery gained momentum.

3 This is a broader definition than the narrower zero-hours contract measure sometimes used and the number relates to *contracts* not *people* (with an unspecified number of people holding more than one contract); see ONS 2014.

4 A further one-quarter said they formed a medium-term strategy, with just 15 per cent declaring them a short-term measure and 16 per cent not knowing (CIPD 2013).

However, there are a number of reasons for thinking that the self-employed will continue to form an increased share of the future labour force. Most fundamentally, the recent increase has its roots in the pre-crisis years, with self-employment rising steadily from the early-2000s onwards. And, while a sizeable minority of the most recent entrants say that they had no better alternatives, three-quarters actively chose to be self-employed (D'Arcy and Gardiner 2014).[5]

Conclusions: supporting tomorrow's labour market

Any projections are necessarily speculative, but based on what's already in evidence we can envisage a future labour market in the UK and in Europe more widely in which more people work, with a shift towards women and older workers. We might expect a growing share of workers to be part-time, subject to non-standard contracts or self-employed. And 'business as usual' is likely to mean a growing polarisation between high-paying and low-paying industries and occupations.

Some of these changes are positive; others will bring new challenges – or, more accurately, will reinforce the need to meet existing challenges – not least concerning low pay and worker rights. We should eschew fatalism and seek new ways of utilising technology and globalisation to halt the hollowing out of our labour force. In part, this requires long-term supply-side solutions relating to education, but more immediate interventions designed to boost demand in the form of mid-skilled jobs may also bear fruit.

To the extent that some of these trends will persist even in the face of such action, we may need to review how appropriate our labour market institutions and public policies are for the new workplace. With union membership on a long-term downward trajectory, we will need to find new approaches to collective bargaining and workforce support. If industrial changes mean that more of the proceeds of growth flow to owners rather than workers – to capital rather than labour – then we should look again at ways of redistributing asset ownership and shifting some of the burden of taxation away from labour income and towards wealth. Tackling our low pay problem requires politicians first to acknowledge that it exists, before establishing a strategy that is both meaningful and realistic. If low pay increasingly comes hand-in-hand with instability of income and hours of work, then we will need to review the adequacy of our working-age welfare system, even as an increasing emphasis is placed on reducing expenditure in the pursuit of deficit reduction.

And we should begin now. We may not yet know what conditions tomorrow will bring, but choosing an outfit that fits today's mixed bag of weather is likely to prove a pretty good place to start.

5 For more on self-employment see Hatfield 2014

References

Bank of England [BoE] (2014) *Inflation Report*, November 2014. http://www.bankofengland.co.uk/publications/Pages/inflationreport/2014/ir1404.aspx

CIPD (2013) *Zero-hours contracts: Myth and reality*. http://www.cipd.co.uk/hr-resources/research/zero-hours-contracts-myth-reality.aspx

D'Arcy C and Gardiner L (2014) *Just the job – or a working compromise? The changing nature of self-employment in the UK*, Resolution Foundation. http://www.resolutionfoundation.org/publications/just-the-job-or-a-working-compromise-the-changing-nature-of-self-employment/

Hatfield I (2014) *Self-employment in Europe*, IPPR. http://www.ippr.org/publications/self-employment-in-europe

Office for National Statistics [ONS] (2014) 'Analysis of Employee Contracts that do not Guarantee a Minimum Number of Hours', statistical release, 30 April 2014. http://www.ons.gov.uk/ons/rel/lmac/contracts-with-no-guaranteed-hours/zero-hours-contracts/art-zero-hours.html

Office for National Statistics [ONS] (2015) 'UK Labour Market, January 2015', statistical release, 21 January 2015. http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/january-2015/statistical-bulletin.html

Pessoa JP and Plunkett J (2013) *A Polarising Crisis? The changing shape of the UK and US labour markets from 2008 to 2012*, Resolution Foundation. http://www.resolutionfoundation.org/publications/polarising-crisis-changing-shape-uk-us-labour-markets-2008-2012/

Whittaker M and Savage L (2011) *Missing Out: Why ordinary workers are experiencing growth without gain*, Resolution Foundation. http://www.resolutionfoundation.org/wp-content/uploads/2014/08/Missing-Out.pdf

1.5
PREPARING FOR TOMORROW'S WORLD OF WORK

PETER GLOVER AND HANNAH HOPE
UK Commission for Employment and Skills

The last 20 years have seen huge changes in the European labour market. These changes have been driven by a range of factors, particularly the interlinked forces of globalisation and technology. At the current pace of change, we can expect the typical workplace of 2030 to look very different to what we see today – but we cannot predict with any precision what exactly this will mean. Twenty years ago there was a widespread belief that a defining feature of the labour market would be radically reduced working hours and increased leisure time. Fast forward to 2015 – the year in which mobile technology is set to overtake the desktop as the principal means of accessing the internet – and our work and leisure hours are increasingly blurred.

We can, however, explore future possibilities and systematically make sense of potential directions of travel. This enables us to start to position ourselves to anticipate opportunities rather than waiting to react. The UK Commission for Employment and Skills (UKCES) has developed an authoritative assessment of future challenges and opportunities in the UK labour market which draws out possible implications for jobs and skills. The Future of Work study seeks to trigger debate about how we can best invest in skills for the future (see Störmer et al 2014).

Our assessment of future jobs and skills is based on a robust, evidence-based approach and uses foresight techniques to explore the future, including a comprehensive literature review, expert interviews and high-level workshops. We analyse existing trends that are shaping the future of jobs and skills and also identify plausible disruptions to these trends. We explore four different development paths, or scenarios, for the UK labour market up to 2030. Based on current trends, the first scenario outlines how a 'business as usual' landscape might develop, while the remaining three feature more disruptive developments.

Envisaging the future workplace

Europe's labour market is forecast to create over 19 million new jobs requiring high-level skills by 2025 (EU Skills Panorama 2014). At the same time, the proportion of young people in the workforce will increase, older people will lengthen their working lifespans, and more women will enter the labour market (Wilson et al 2014). Workplaces will be multigenerational and continued global mobility will mean that they grow in ethnic and national diversity.

Work environments will be pervaded in every way by technology. Workers who perform routine tasks that can be replaced or deskilled by technology will continue to be vulnerable. Facilitated by technology, workplaces and ways of working will become increasingly virtual. Businesses and individuals will become more flexible, in a shift towards a 24-hour society. Already, businesses are increasingly able to create and disband corporate divisions rapidly, as they shift tasks between slimmed down pools of long-term core employees, international colleagues and outsourced external service providers. In 2013, 67 per cent of employees worldwide were working in more actively collaborative ways, while 57 per cent reported an increase in the number of their coworkers based in other countries (Thompson and Truch 2013).

It is likely that the resulting flexibility in employment relationships will place the onus on individuals to take the core responsibility for their skills development, as widely distributed and increasingly virtual workforces mean that maintaining skills presents a challenge to traditional management practices. At the same time, leaner management structures and virtual workforces will vest individuals with greater autonomy, making the importance of self-management paramount.

The boundaries between disciplines, such as between natural sciences and informatics, are becoming increasingly blurred. As disciplines converge, so do their technologies. The convergence of technologies and cross-disciplinary skills can disrupt existing business models, but also create completely new markets and novel applications. In turn, it creates a need for effective interdisciplinary working and increases demand for hybrid skills.

Structurally, we can expect to see the development of new business ecosystems. Many companies will be less concerned with their internal capabilities and more focused on the value they can draw from external networks. This will lead to a greater degree of collaboration across value chains and outsourcing of tasks to external project teams, facilitated by the virtualisation of business processes. Companies and workers will need the ability to collaborate across virtual teams, demonstrate cultural sensitivity and manage complexity.

The quantity and richness of data generated by the digital economy is growing rapidly: it is projected that by 2017 the amount of data traversing global networks in one year will exceed the total amount of data accumulated between 1984 and 2012 (Cisco 2013). Analysing this data offers a tremendous opportunity to identify potential efficiency gains and new business models and niches.

Globally, economic power is shifting towards emerging economies, resulting in growing international competition for business. In the last decade, China has quintupled its number of graduates and doubled its number of higher education institutions (OECD 2012). With Asia projected to account for about 60 per cent of global middle-class consumption in 2030, the continent promises high growth and profitable investment opportunities along with a strong and growing workforce (Pezzini 2012).

Finally, these trends should be seen against a backdrop of challenges to governments' scope to invest in employment and education initiatives. The competing fiscal pressures of growing social transfer payments, pension burdens and public debt make this form of investment increasingly difficult.

While the scenarios in the UKCES study focus on the UK labour market, the analysis is based on global trends and disruptions, such as globalisation and technological advance, which hold important and relevant lessons for the wider European labour market. Furthermore, the British and European markets have some of these trends in common, including an ageing workforce, increasing numbers of people with high-level qualifications, an expectation that more women will want to work, and an expectation that jobs will become increasingly skill-intensive (Cedefop 2013).

Exploring potential disruptions

In sketching out possible futures it is not wise to rely on the extrapolation of established trends alone. The process of exploring potential disruptions allows us to identify specific, known sources of uncertainty, which can be used as the basis for developing alternative scenarios. In this case, disruptions are events that represent a sharp deviation from business as usual and have radical implications for jobs and skills. Our study explored 10 such disruptions, on the basis of their plausibility and the likely severity of their impact if they were to occur. In considering possible structural changes to the labour market that would impact on skills demand in particular, three of these disruptions are worth focussing on.

Alternative centres of excellence

As emerging countries develop the infrastructure, regulation and labour markets necessary to push them to the next level of

development, it is possible they could take global leadership of sectors and activities that are currently centred elsewhere. These countries benefit from a number of potential advantages which make them attractive to investors, including their potential as rapidly growing markets, support from interventionist governments and low labour costs. PwC, for instance, predicts that within 30 years the majority of the world's largest industrial clusters will be located in markets that today we think of as 'emerging' (PwC 2010). This would have a massive impact on jobs and skills, and is considered to be a realistic or likely prospect.

Zero-hours contracts

Opinions differ about how widespread zero-hours contracts are currently.[1] However, a key concern, should they become the norm, lies in their impact on individuals' and businesses' skills investment decisions. In this scenario, both employees and employers might feel less inclined to invest in training and development, which would have a serious negative effect on Europe's ability to increase productivity levels.

Robotics and artificial intelligence

Some academics believe that such technologies could be used to automate huge swathes of existing jobs.[2] This would extend beyond routine clerical jobs, which are already being displaced by technology at a significant rate, to include higher-level professional jobs, which hitherto have been a major source of employment growth. Although the European labour market has been creating sufficient jobs to offset the impact of technological change for at least two centuries, the projected rate of change in the future might mean this record cannot be sustained.

Managing skills supply for tomorrow's world of work

Although we cannot know the future, by exploring some of the possibilities our study has highlighted key areas of consideration for employers, individuals, education providers and policymakers in preparing for tomorrow's world of work.

Individuals in the future will need to take greater responsibility for their own ongoing development, partly as a response to the changing nature of the employment relationship but also in order to maximise their personal agility in the labour market. In the face of limited investment from government and employers, individuals should take personal responsibility for acquiring and constantly updating skills for progression.

1 See Matthew Whittaker in this volume for more on non-standard forms of employment.

2 See for example Frey and Osborne 2013.

The growing importance of technology to the learning process itself will have to be recognised. Institutions should look to harness these technologies to respond to the diverse demands of students and workers, and develop flexible learning pathways that reflect the changing employment landscape. In turn, the impact of technology on how teaching and training is delivered will present individuals with new and different approaches to learning, which they should embrace. The boundaries of 'specialist knowledge' will become blurred, as technologies and disciplines converge in the constant search for innovation. Individuals should be willing and able to jump across specialist knowledge boundaries, and so to develop a blend of technical training and 'softer', collaborative skills.

Education and training provision should reflect the growing importance of interdisciplinary approaches to innovation and the influence of technology, and providers should collaborate closely with employers to support them in achieving their business needs. Individuals and employers will need to be able to work across different disciplines, to collaborate virtually, to demonstrate cultural sensitivity, and to respond to increasingly flexible working practices, as well as keeping up with the new skills that new technologies will demand.

Employers should look to collaborate on an industry-wide scale to overcome key skills challenges, fostering resilience and the capacity to innovate in the face of intensifying global competition. They should strengthen their collaboration with the education sector to ensure they can access critical skills. Employers should also develop their capability to manage skills and talent across global business networks and supply chains, as more open business models and more fluid employment arrangements will make this essential.

In government, the complexity and the sheer rate of change are likely to make existing policy models obsolete, while constraints on public resources will limit the opportunity to invest directly. The challenge for government, therefore, will be to help to facilitate an employer-led 'engine' of skills development and to effectively align public and private investment around this.

We cannot specify exactly how the supply of skills to the European labour market needs to change in response to the shifts in demand that will be caused by structural changes, because we cannot know the future with any certainty. However, there are present trends – some of which may be accentuated in the future – which are already causing structural changes in the labour market, and which call for a response.

References

Cedefop (2013) *Roads to recovery: three skill and labour market scenarios for 2025*. http://www.cedefop.europa.eu/en/publications-and-resources/publications/9081

Cisco (2014) *Cisco Visual Networking Index: Forecast and Methodology, 2013–2018.* http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.html

EU Skills Panorama (2014) *European job growth creators*, Analytical Highlight. http://euskillspanorama.cedefop.europa.eu/AnalyticalHighlights/

Frey CB and Osborne M (2013) 'The future of employment: how susceptible are jobs to computerisation?', Oxford Martin School. http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

OECD (2012) *Education Indicators in Focus*, 2012/05. http://www.oecd-ilibrary.org/education/education-indicators-in-focus_22267077

Pezzini M (2012) 'An Emerging Middle-Class', OECD Observer website. http://www.oecdobserver.org/news/fullstory.php/aid/3681/An_emerging_middle_class.html

PwC (2010b) *See the Future: Top Industry Clusters in 2040 Revealed*. https://www.pwc.com/jp/ja/japan-knowledge/archive/assets/pdf/archive_SeetheFuture_en.pdf

Störmer E, Patscha C, Prendergast J, Daheim C, Rhisiart M, Glover P and Beck H (2014) *The Future of Work: Jobs and Skills in 2030*, UK Commission for Employment and Skills [UKCES]. https://www.gov.uk/government/publications/jobs-and-skills-in-2030

Thompson J and Truch E (2013) *The Flex Factor: Realising the Value of Flexible Working*, RSA

Wilson RA, Beaven R, May-Gillings M, Hay G and Stevens J (2014) *Working Futures 2012–2022*, UK Commission for Employment and Skills [UKCES]

1.6
BEYOND THE HEADLINES: ANALYSING SKILLS DATA OVER THE LONG TERM

MICHAEL J HANDEL
Northeastern University, Boston

It is commonly believed that the demand for skills at work is now or soon will be rising much more rapidly than in the past, and that the rapid diffusion of information and communication technologies (ICT) is a major reason for this current or anticipated change. This is often coupled with concern that the supply of skills is not keeping pace with demand, or at least will soon fall behind. However, despite these concerns being widespread, our understanding of skill trends, technology and their possible interrelationships remains rather vague, and seeking to address this reveals some significant conceptual and methodological challenges. Furthermore, the evidence that is available to address the issue suggests only a gradual trend towards greater skill requirements has occurred in most European economies since 1950, with no recent acceleration.

The challenge of measuring skill supply and demand

Certainty regarding skill supply – the job-relevant skills possessed by the workforce and potential new entrants to the labour market – is limited by the shallowness of available measures. Typically, workers' skills are measured by total years of schooling or highest education level attained. However, test scores can make finer distinctions within and between education groups, and highlight concerns about the true value of education levels as a proxy for skills. Other qualitative variations appear between diverse fields of study, academic and career-focussed, at the secondary and post-secondary levels. Test scores and field of study time-series data would provide much richer detail on trends in skill 'stocks' than schooling data alone, but these are scarce. Even less common is data on the various kinds of shorter-term training and informal learning that often provide the ICT skills and other specific competencies sought by employers.

On the other side of the equation, measures of the skills required by jobs are still less common and less well-conceptualised.[1] One useful approach is to divide job skill requirements into cognitive, interpersonal and physical demands, and to specify the contents of each domain.

Cognitive demands are the focus of most attention, and studies indicate they are associated with the greatest rewards. This domain includes required level of education; particular general academic skills (such as levels of reading, writing and mathematical ability); general reasoning ability; specialist knowledge of varying complexity; ICT skills of different kinds and complexity; and the countless kinds of information, knowledge and skills that are specific to particular occupations and positions, and which can only be captured on a common scale by general measures, such as years of prior experience. The qualitative variation across sectors found in task lists is not easily translated into common, quantitative metrics, which means the measures usually cannot be used to produce a picture of overall employment. One prerequisite for measuring a possible mismatch between skills supply and demand with any specificity is to be able to gauge both workers' skills and job skill requirements according to a common unit. It is straightforward to measure educational attainment and the educational requirements of a job in the same units, but progress has only just begun to be made with respect to some other cognitive skill dimensions, and such data is not plentiful.

Interpersonal job requirements can be elaborated in a similar fashion, but there is very little clarity on concepts and measures, weak evidence on the rewards of meeting these requirements, and even less progress in putting the measurement of workers' skills and job demands on a common scale for effective comparison. Although it is generally accepted that the need for 'people skills', such as teamwork, communication and customer service, is growing rapidly and poses significant challenges in terms of workforce preparedness, the formal bases for this belief are relatively undeveloped.

Physical job demands can be divided into unskilled tasks, such as simple motions and physical exertion, whose relative decline is an index of progress, and skilled manual job tasks, like tool use in craft and repair work. For the most part, these tasks, and the skills needed to fulfil them, are easier to record, although their variability makes it difficult to bring them together into aggregate measures.

1 The following is drawn from Handel 2008 and Handel 2015.

The influence of technological change on skills demand

Measuring the spread of ICT and its effects on job requirements presents its own challenges. ICT may increase job skill demands through several pathways, which are not mutually exclusive:

- ICT may alter the task content within occupations because:
  - the software and hardware are difficult to learn (computer-specific human capital)
- ICT increases the weight of cognitive tasks relative to physical or less complex cognitive demands (general human capital).
- ICT may alter the distribution of workers across occupations because:
  - more skilled workers are needed to manage the technology itself (such as database administrators, network technicians and webmasters) or to analyse the information it generates (eg planners and big data analysts)
  - fewer lower-skilled workers are needed due to automation (eg manufacturing production workers, data-entry clerks and mail sorters)
  - more lower-skilled workers are needed due to the elimination of skilled workers (eg printing).
- ICT may alter the distribution of workers across industries with different skill profiles because it:
  - creates or expands product/service demand in relatively higher-skilled sectors (such as software, IT services, video game production, social media and other dotcoms)
  - reduces demand in relatively lower-skilled sectors (eg postal services, book and music stores and fixed-line telecommunications)
  - increases demand in relatively lower-skilled sectors (eg app-based taxi services and other digitally enabled microwork).

The data requirements for investigating these different mechanisms in a systematic fashion vary. In addition to the job content measures discussed already, we would need to be able to measure not only the prevalence and complexity of various kinds of software used by workers, but also the extent of various hardware systems that might be substituting for them. Time-series data for the shares of occupations in the workforce is available, but determining, for example, whether a drop in the number of production workers reflects automation or outsourcing is not always simple. Likewise, industry data is not always sufficiently detailed to identify subsectors of interest – in part, this reflects the relatively small size of many of the emerging businesses which attract so much attention on account of their novelty.

This raises an important note of caution about the common practice of citing examples, as we have done in the list above. Classification schemes used in official statistics commonly recognise approximately 500 detailed occupations and 200 detailed industries. This means that the average occupation accounts for 0.2 per cent of total employment and the average industry accounts for 0.5 per cent. Just as moving from broad hunches regarding skill trends to hard metrics is more complicated than might at first be imagined, moving from anecdote to data regarding their presumed technological drivers is complex. Visible novelty must generalise over a wide swath for its impacts to be significant.

Assessing long-run trends

With these complexities in mind, we can examine some evidence for trends in direct measures of job skill requirements and occupational shares. The European Working Conditions Survey (EWCS) provides trend data for a limited number of measures of cognitive, interpersonal and physical job demands, as well as computer use at work. These are shown in the following three tables.[2] Although the cross-sectional patterns are largely consistent with expectations, there is remarkably little change over time.[3]

Moreover, these findings do not change in light of more recent figures from the 2010 survey wave, at least with respect to the critical cognitive skill dimension:

> *'A fundamental aspect of developing in a job is having the opportunity to tackle cognitive challenges at work – for instance, learning new things, solving unforeseen problems on one's own, or performing complex tasks. This is important both for workers' own wellbeing, and for companies to ensure that they continually upgrade their in-house capacity to create and innovate. Broadly speaking, there has been no marked improvement over time in this respect.'*
>
> Eurofound 2010

It is notable in table 1.6.1 that workers are much less likely to say their job involves complex tasks than problem-solving or learning new things. For many jobs, problem-solving and learning may be at a sufficiently low level that they do not contribute much to job complexity. In any case, this ambiguity underscores the importance of using multiple items and the hazards of seeking concrete conclusions from very general questions. While the results for the 2015 wave of

2 For more, see Handel 2012.

3 There are some exceptions, such as the surprising fall in the share of jobs in the UK requiring each of the three types of cognitive skill, which merits further examination.

the EWCS may show a different picture, it would not be surprising, given previous trends, if they did not.

Table 1.6.2 indicates that computer use at work increased by slightly less than one percentage point per year between 1990 and 2005, but this seemed to have no impact on the cognitive skill measures in the prior table, or on the EWCS measure of interpersonal tasks in this table. This may be because the most common applications of ICT do not have steep learning requirements, which facilitates their mass diffusion.

Table 1.6.3 indicates no strong trend in various measures of physical demands.

Table 1.6.1
Share of jobs involving cognitive demands, by skill type, 1995–2005 (%)

	Complex tasks			Problem-solving			Learning new things		
	1995	2000	2005	1995	2000	2005	1995	2000	2005
EU15	59.6	60.3	59.2	80.0	81.1	78.2	74.5	71.6	67.0
Anglo-Saxon									
Ireland	52.9	51.5	54.9	75.0	72.1	76.4	75.2	68.3	76.7
UK	71.1	63.4	58.5	89.9	82.6	78.9	81.9	77.0	71.4
Continental									
Austria	74.2	76.8	77.8	78.1	78.4	77.3	74.3	69.6	71.7
Belgium	48.3	49.0	54.7	80.0	86.4	87.9	66.6	75.4	76.7
Germany	60.9	69.1	69.9	75.4	79.3	75.9	72.6	69.0	63.4
France	52.6	52.6	52.3	82.2	86.0	83.1	73.6	72.7	68.4
Luxembourg	60.2	53.5	63.6	77.6	74.3	85.0	73.4	76.2	75.0
Netherlands	63.3	62.3	62.6	91.7	93.9	93.7	80.5	80.2	82.4
Nordic									
Denmark	61.0	63.8	76.1	90.8	92.3	94.2	84.2	86.1	88.2
Finland	67.9	72.1	72.6	85.9	77.4	79.0	90.0	90.8	89.9
Sweden	72.0	56.5	67.9	93.2	92.2	96.4	86.3	81.5	89.4
Southern Europe									
Greece	46.1	46.4	54.0	67.0	62.7	68.7	52.1	48.6	63.0
Italy	46.5	40.6	46.2	73.8	73.9	72.4	74.3	70.3	68.2
Spain	37.6	41.0	39.3	84.2	81.2	77.9	62.0	63.9	60.0
Portugal	40.8	42.6	53.8	75.7	69.6	78.7	69.6	58.4	67.6

Source: Author's tabulations, in Handel 2012
Notes: Figures indicate those responding 'yes' to questions on whether their main job involves 'complex tasks', 'solving unforeseen problems on your own' and 'learning new things'. Wage and salary workers only. Figures use country- and year-specific post-stratification weights. EU15 totals adjust weights by the relative size of each country's workforce for each year, derived from the European Labour Force Survey.

Table 1.6.2

Share of jobs using computers and involving public contact, 1990–2005 (%)

	Computer use				Public contact		
	1990	1995	2000	2005	1995	2000	2005
EU*	35.7	41.8	43.7	49.1	65.1	61.1	65.4
Anglo-Saxon							
Ireland	37.8	39.1	47.0	53.4	70.9	62.6	71.6
UK	43.4	57.7	56.0	53.4	77.7	71.1	69.1
Continental							
Austria		39.2	38.2	45.8	64.8	62.7	64.1
Belgium	33.8	39.5	48.1	63.0	61.0	63.5	63.4
Germany	33.7	39.6	39.8	49.4	59.7	54.7	62.9
France	35.1	35.5	42.1	46.9	70.7	65.0	67.2
Luxembourg	34.2	42.7	48.9	57.8	63.3	57.5	65.5
Netherlands	44.2	56.0	62.2	70.7	71.3	72.8	67.8
Nordic							
Denmark	39.9	42.1	45.1	63.1	70.2	69.4	77.8
Finland		49.8	54.9	60.4	69.9	73.1	71.9
Sweden		49.2	49.7	72.1	79.1	73.8	78.0
Southern Europe							
Greece	16.6	15.7	25.7	30.3	59.2	61.2	58.3
Italy	34.6	33.4	38.5	43.6	56.9	61.6	64.6
Spain	25.2	28.1	28.8	40.4	58.0	49.3	63.0
Portugal	22.7	26.8	29.1	34.9	55.2	41.0	60.8

Source: Author's tabulations, in Handel 2012

Notes: Figures indicate those saying they spend at least one-quarter of their time working with computers and dealing directly with people who are not employees at their workplace, such as customers, pupils and patients. Wage and salary workers only. Figures use country- and year-specific post-stratification weights. EU15 totals adjust weights by the relative size of each country's workforce for each year, derived from the European Labour Force Survey.

* Only EU12 countries participated in the 1990 survey wave, but EU-wide averages in later years are not sensitive to exclusion of other countries.

Table 1.6.3
Share of jobs involving physical and related job requirements, 1990–2005 (%)

	Heavy loads				Machine paced			Vibrations			Repetitive motions			Monotonous tasks		
	1990	1995	2000	2005	1995	2000	2005	1995	2000	2005	1995	2000	2005	1995	2000	2005
EU*	15.4	18.7	23.1	18.9	22.5	22.1	18.5	24.0	23.6	21.4	44.2	43.5	49.2	45.4	39.3	42.5
Anglo-Saxon																
Ire	17.0	17.1	20.0	17.2	27.0	26.0	12.7	20.4	22.3	16.0	39.8	46.9	41.7	58.4	51.7	45.2
UK	16.2	18.3	24.8	18.1	27.0	22.8	20.8	15.8	16.9	14.4	52.3	44.5	46.9	68.0	57.5	57.5
Continental																
Bel	14.7	20.0	20.3	14.6	16.9	19.0	15.6	19.7	20.2	13.6	44.1	40.9	39.0	36.8	31.4	31.7
Ger	14.7	17.6	21.3	16.1	20.2	21.7	17.7	28.2	27.0	26.8	37.3	34.5	42.7	33.9	26.5	29.3
Fra	20.4	25.0	28.5	27.9	23.1	21.3	19.2	22.8	22.7	22.4	53.1	57.3	60.2	49.6	42.6	44.7
Lux	12.6	14.6	19.9	18.0	26.6	23.7	15.5	25.6	20.0	19.5	35.3	41.9	49.6	42.8	30.6	36.7
Ned	11.4	14.4	15.0	10.8	21.6	16.8	12.1	13.0	13.4	13.1	50.7	53.3	46.1	32.9	27.3	23.2
Aus		22.7	21.7	22.9	20.5	18.4	21.1	26.4	25.0	22.9	42.6	40.1	51.8	31.7	27.8	3.00
Nordic																
Den	13.6	17.6	16.5	13.1	14.3	12.5	12.0	15.5	14.7	14.3	38.3	39.3	50.8	39.5	37.4	42.3
Fin		14.6	16.3	19.5	22.1	18.9	20.8	21.6	24.1	20.2	55.0	58.9	72.5	46.2	46.6	47.9
Swe		18.0	23.4	15.6	12.0	9.0	6.5	13.9	17.5	11.8	29.0	50.0	50.1	26.6	26.8	18.7
Southern Europe																
Gre	18.6	19.8	23.9	27.1	28.8	22.3	18.7	32.0	24.9	28.7	62.2	57.7	69.8	63.2	53.2	57.5
Ita	8.2	12.8	15.4	12.5	24.4	22.7	17.7	20.5	24.7	18.2	43.8	42.7	53.4	48.0	36.2	43.5
Spa	18.8	21.7	29.9	24.1	25.2	29.0	17.6	30.0	32.4	19.5	54.2	62.8	55.4	63.5	60.7	64.2
Por	17.7	15.3	19.2	19.0	27.0	21.0	25.7	29.9	30.4	28.6	58.6	53.9	63.9	47.0	42.9	51.7

Source: Author's tabulations, in Handel 2012
Note: Figures indicate those saying they spend at least half of their time at work carrying or moving heavy loads and making repetitive hand or arm movements, at least one-quarter of their time 'exposed to vibrations from hand tools, machinery, etc' and who answered 'yes' to questions asking whether their work pace is 'dependent on the automatic speed of a machine or moving of a product' and whether their job involved 'monotonous tasks' or not. Wage and salary workers only. Figures use country- and year-specific post-stratification weights. EU15 totals adjust weights by the relative size of each country's workforce for each year, derived from the European Labour Force Survey.
* Only EU12 countries participated in the 1990 survey wave, but EU-wide averages in later years are not sensitive to exclusion of other countries.

Needless to say, this data does not provide the final word on measuring job skill requirements, and continuing data limitations leave room for much uncertainty. Nonetheless, more traditional time series on occupational shares since 1950 or 1960 and other skill measures drawn from US databases and applied to European occupational time series since the early 1990s also show only gradual change in the expected directions.[4] ICT may change the composition of employment and upgrade job skill requirements dramatically in some limited areas that receive a great deal of notice. However, it is also likely that the most high-profile cases project rather poorly onto the larger economy.

References

Eurofound (2010) 'Changes over time – First findings from the fifth European Working Conditions Survey'. http://eurofound.europa.eu/publications/resume/2010/other/changes-over-time-first-findings-from-the-fifth-european-working-conditions-survey-resume

Handel MJ (2008) 'Measuring Job Content: Skills, Technology and Management Practices', discussion paper 1357-08, Institute for Research on Poverty, University of Wisconsin. http://www.irp.wisc.edu/publications/dps/pdfs/dp135708.pdf

Handel MJ (2012) 'Trends in Job Skill Demands in OECD Countries', working paper 143, OECD. http://www.oecd-ilibrary.org/social-issues-migration-health/trends-in-job-skill-demands-in-oecd-countries_5k8zk8pcq6td-en

Handel MJ (2015) 'Measuring Job Content: Skills, Technology, and Management Practices' in Buchanan J, Finegold D, Mayhew K and Warhurst C (eds) *The Oxford Handbook of Skills and Training*, Oxford University Press

4 For more, see Handel 2012.

2.1
FLEXIBILISATION, AND HOW GERMANY'S REFORMS SUCCEEDED

WERNER EICHHORST
IZA

At the turn of the century, when searching for ways to overcome a protracted labour market crisis that involved large numbers of unemployed, a high proportion of long-term unemployment and levels of employment that were generally too low, Germany turned its attention to the experiences of other countries. This included the OECD's employment strategy, which was underpinned by a comprehensive empirical analysis and favoured deregulation of labour markets as a way of increasing overall employment levels. Implicit in this strategy was the suggestion that the 'Anglo-Saxon' approach of the United States and UK was an ideal model. These countries viewed less generous benefit systems and lower levels of protection against dismissal as going hand-in-hand with a more dynamic labour market.[1]

Nevertheless, no such US- or UK-inspired deregulation policies were implemented in Germany – or the majority of other continental European countries – in the years that followed. One of the main reasons was that this type of reform strategy was considered to be politically unacceptable; it was perceived by the public to be a system that fostered social inequality. Another reason was that the 'employment miracles' taking place in the Netherlands, Denmark and Austria were attracting much more attention precisely because they were happening without massive deregulation. It was felt that a more generous benefits system was in fact compatible with a high level of employment, so long as appropriate steps were taken to ensure that jobseekers were actively looking for work, with the help of targeted labour market policies – an approach often referred to as 'flexicurity'.

1 This is an updated summary of a study carried out for the Konrad Adenauer Foundation, 2013, available at http://www.kas.de/wf/doc/kas_34465-544-2-30.pdf?140218161147

The intensive labour market and welfare state reforms that Germany carried out in the first half of the 2000s owed a lot to these international models. However, the German version of reform was characterised by neither a full-blown liberal Anglo-Saxon model, nor a comprehensive flexicurity strategy. It was more a case of following a path that best suited the country's own institutional conditions and political constellations. The German reforms were not pursued on the basis of some form of consensus with social partners, but as part of a clear initiative by the red/green federal government of the time.[2] The labour market reforms, typified by the 'Hartz reforms' of 2002–05 and 'Agenda 2010', were largely a collection of more-or-less compatible individual measures designed to address specific problem areas.[3]

They are deemed to have been successful largely due to the performance of the German labour market in the period since the financial crisis. While almost every other country in Europe saw unemployment increase in the recession that followed the crisis and has struggled to reduce it subsequently, unemployment continued to fall in Germany and is lower now than in 2007 (Eurostat A).

Creating an 'activating' welfare state

The importance of putting specific limitations on benefit payments cannot be overestimated, in terms of the activation policy that was applied to unemployment benefits in Germany. This is especially true of the following actions:

- shortening the period during which unemployment benefits can be claimed by older workers
- combining means-tested and earnings-related unemployment benefits and social welfare payments as a means of providing basic security to jobseekers of working age, but at social welfare levels
- instituting a stricter formulation and implementation of the demands placed on those receiving benefits, such as a duty to accept job offers and active labour market policy initiatives.

In this way, the German strategy of trying to 'activate' the unemployed utilises a combination of carrot and stick elements aimed at shortening, where possible, the length of time a person remains without work. A package of more comprehensive but also more flexible measures was put together for the long-term unemployed that could be adapted to the needs of the individual. Support for jobseekers was also intensified and the employment services given a thorough overhaul. As part of the Hartz reforms, many labour market policy instruments were amended to make

2 A coalition of the Social Democratic party (SPD) and Alliance 90/Greens.
3 For more details of the Hartz reforms see Jacobi and Kluve 2006.

them more effective in helping people to assimilate more quickly into the labour market. For example, long-established retraining programmes were replaced by shorter courses.

In all this, Germany was following the example of other countries. The basic principles of labour market and welfare policies designed to 'activate' the unemployed, included stricter monitoring of their attempts to find work and imposition of stronger sanctions; the creation of a common point of contact for all (long-term) unemployed; the increased mobilisation of those responsible for implementing labour market policies; the agreement of targets and financial incentives; and the modernisation of the federal employment agency.

Making the labour market more flexible

In order at the same time to improve the *capacity* of the labour market, the Hartz reforms included greater liberalisation of flexible working arrangements, or so-called 'atypical' jobs. This predominantly had an impact on temporary employment, 'mini-jobs' and self-employment, without significant changes being made to permanent employment or to existing protection against dismissal for those in permanent employment.

Temporary employment

Temporary employment was significantly liberalised as part of the Hartz reforms, leading to a massive growth in employment in this area. Some restrictions were lifted, such as the ban on synchronising and setting fixed terms for employment contracts and allocation to temporary staff agencies and the upper time limit for hiring staff. At the same time, the principle of equal treatment for temporary and permanent staff was established – although exceptions could be made when recruiting unemployed people or in the case of collective bargaining agreements.

The consequence of this was that, for the first time, the temporary employment sector was covered by collective bargaining agreements between employer associations and unions. However, in those sectors that tended to employ the most temporary staff, pay scales could be significantly lower than those set out in the collective bargaining agreements already in place. This created an incentive for the industrial sector to shift some of its activities over to flexible and less well-paid workers.

The role of temporary employment in helping to better assimilate the unemployed into the labour market – one of the original goals of the Hartz reforms – also changed. While the expectation that the long-term unemployed in particular would get an opportunity to enter the labour market has been largely fulfilled, there has been limited

success in turning these opportunities into regular jobs. Temporary staff are being used by many sectors as a way of creating long-term flexibility and reducing overall staff costs, rather than as a way of recruiting permanent staff. Based on what we know today, there is little evidence that temporary work is providing a 'wide bridge' to more permanent working arrangements.

Part-time work and mini-jobs

Mini-jobs existed in Germany long before the advent of the Hartz reforms. However, they became more widespread from 2003 onwards as a result of certain crucial changes. The earnings limit for a job that was exempt from contributions and taxes – which is now known as a mini-job – was raised to €400 per month. At the same time, the restrictions on taking such a job to supplement one's income – put in place at the end of the 1990s – were lifted. The upper time limit for these jobs was also removed, so that longer working hours and lower pay became a possibility for this segment of the workforce. Since then, mini-jobs have become increasingly popular in specific sectors, such as retail and hospitality, because they are both flexible and relatively cheap for the employer. The exemption from tax means that people taking these jobs generally earn lower wages and often face significant obstacles when it comes to securing more hours.

The expansion of mini-jobs has had a significant impact on the job structures of many cost-sensitive areas of the service sector, such as retail trade, commercial cleaning and the hospitality business. Mini-jobs were designed as an instrument to create flexible and low-cost part-time working arrangements. However, the price paid for this move was an expanded low-pay sector and reduced progression opportunities. The initiative also failed to move jobs out of the informal economy into the official economy.

Self-employment

Another area of the German reforms was aimed at promoting self-employment. Liberalisation and the introduction of various measures were intended to make it easier for both the unemployed and those already in jobs to become self-employed. Existing obstacles to self-employment were lifted. In many trades it became possible to run a business without a master craftsman's diploma, while in other areas there was a relaxation of the strict definition of self-employment that distinguishes it from paid employment. The opportunities for fixed-term employment contracts were also expanded for newly formed companies. Finally, huge incentives were given to the unemployed to take up self-employed work. This took the shape of new support for people to start businesses, as part of the Ich-AG initiative, which was later assessed as being particularly effective and relatively cheap.

Fixed-term contracts and protection against dismissal
The same approach applied to the employment of older workers on fixed-term contracts, which has also become much easier since the mid-2000s. Since 2000, the legality of fixed-term contracts has not changed and these types of contracts have actually grown in importance. Reforms in 2000 limited the maximum total period of repeated fixed-term contracts with the same employer without specific reason to two years. However, there have been no further changes to the protection provided under employment law. The last reform, which came into effect in early 2004, simply raised the threshold for applying the protection against dismissal laws from five employees to 10, simplified the social criteria for redundancy, and introduced the option of a severance payment.

Modern collective bargaining policies and internal flexibility
However, labour market reforms are only one of the factors that explain the reduction in unemployment and the increase in the number of people employed in Germany. Apart from the changes in legislation, an important factor was the increased flexibility of standard employment terms and conditions. This longer-term adaptation of standard employment contracts has contributed significantly to the stabilisation, after an earlier period of contraction, of the number of people working in permanent employment.

There are a number of reasons underpinning the significant changes seen in the collective bargaining landscape since the mid-1990s, including the declining competitiveness of German businesses, the relocation of businesses and jobs abroad, and an ever-increasing unwillingness on the part of companies to become members of employers' associations. When it comes to collective bargaining agreements, changes have been made in some sectors, such as the metal and electrical industries, to allow for adaptations and deviations from agreed standards via special clauses. This created more flexibility for businesses in terms of pay and working hours. For their part, the unions and workers' councils within companies were prepared to make concessions in order to safeguard jobs in the predominantly unionised core workforces. This heralded the beginning of a long period of wage restraint from the mid-1990s onwards, which in the medium term, thanks to lower unit labour costs, led to an increase in the competitiveness of Germany's export-oriented industries.

This growing acceptance of greater flexibility in wages and working hours within those sectors covered by collective bargaining agreements was further enhanced by companies undertaking internal restructuring. This helped to stabilise employment numbers in the industrial sector and even allowed them to increase slightly, thanks to the positive trend in German exports. However, it should be pointed out that the number of workers covered by collective bargaining agreements has actually declined.

The outlook for Germany's labour market

Germany's successes in employment policy cannot be attributed to government labour market reforms alone. Rather, they are also the result of changes in the relationship between the parties to collective bargaining agreements and broader, more long-term developments within the private sector. However, the increase in employment over the last decade has been associated with wider dispersion of working conditions, in terms of wages and employment types. This, against a backdrop of lower unemployment in recent years, has motivated calls for a stricter regulation, for example with respect to temporary agency work, and the introduction of a statutory minimum wage in 2015. Further changes will no doubt be required as Germany's labour market shifts and adapts to changes in wider economic conditions nationally and across the region.

References

Eurostat (A) 'Unemployment rate by sex and age groups', dataset. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_m&lang=en

Jacobi L and Kluve J (2006) 'Before and After the Hartz Reforms: The Performance of Active Labour Market Policy in Germany', discussion paper 2100, Institute for the Study of Labor [IZA]. http://ftp.iza.org/dp2100.pdf

2.2
UNPICKING THE GERMAN JOBS MIRACLE: IS GERMANY A LABOUR MARKET ROLE MODEL?

MICHAEL FISCHER AND JÖRG BERGSTERMANN
United Services Union and Freidrich Ebert Stiftung

Before the outbreak of the financial crisis in 2008, Germany was often regarded as the 'sick man of Europe', with sluggish economic growth and a relatively high level of unemployment. Germany's economy seemed hardly prepared for the challenges of the new millennium. But this view has changed fundamentally in recent years. While many European countries experienced a serious economic decline, sluggish recovery and soaring unemployment, Germany's economic recovery from recession started quickly and its labour market seemed to experience almost no lasting hangover. On the contrary, unemployment fell further and Germany's exports and trade surpluses broke one record after another, which many experts and politicians took as an indication not only of outstanding competitiveness but also of a fundamentally healthy economy. Much of this strong performance has been attributed to the structural reforms of the 'Agenda 2010' programme, a set of policies adopted since 2003 to make the labour market more flexible, to deregulate temporary work (*Leiharbeit*) and to restrict employment benefits.[1] Now such measures are also being recommended to other countries in a state of economic crisis.

Examining 'the jobs miracle'

This popular view of Germany's economic and employment performance suggests labour market reform has been the essential element in preparing the country for wider challenges. But the country's crisis management strategy was about more than labour market flexibility. Also important were the effects of automatic stabilisers, collaborative efforts within a (still relatively well-established

1 See Werner Eichhorst in this volume for more on Germany's reforms during this period.

but pressurised) system of social partnership, and a successful business cycle policy.

Furthermore, the reforms have produced some negative effects. For more than a decade, Germany has found itself on a trajectory of polarisation – in fact, a double polarisation. While a polarised labour market – in terms of high and low-skilled jobs – has started to take root, it is also possible to observe an increasing polarisation of economic sectors, which is creating significant internal and external imbalances.

Persistently high trade surpluses indicate a lack of domestic demand. One reason for this is unequal wage developments in export industries on the one hand and in the more domestically oriented service sector on the other. By 2011, average hourly income in the private service sector was almost 20 per cent lower than in the manufacturing sector (Stein et al 2012). One result is that many low-wage earners in the service sector are dependent on government assistance to sustain a decent standard of living. In addition, low hourly wages often go alongside insecure working models. Temporary work – a marginal phenomenon in Germany 10 years ago – now accounts for about 1 million jobs. Part-time working has also increased. The structural reforms of 'Agenda 2010' might have put more people into work, but overall working hours have almost stagnated. Employment has not grown but is distributed among more people, including more part-time workers and so-called 'mini-jobbers' (Dauderstädt 2013).

These developments also exert pressure on the established dual system of vocational education and training, which is widely seen as creating a culture of skilled labour (*Facharbeiterkultur*) and is often said to be one of the main reasons for Germany having one of the lowest levels of youth unemployment in Europe. The annual education report of the Confederation of German Trade Unions (DGB) regularly finds that about one-third of young people searching for an apprenticeship position do not succeed in finding one, that the number of firms offering such positions is declining, and that recently in certain sectors – in commerce, retailing, the food service industry and crafts – the quality of education and training has diminished significantly, leading to high dropout rates of up to 50 per cent (DGB Jugend 2014). At the same time, though, not all firms are able to fill their apprenticeship schemes, suggesting there is something of a mismatch between the aspirations of young people and the needs of employers.

This suggests German economic and labour policies have enabled many businesses to follow a 'low-road' strategy of cost-cutting (including wage-dumping) instead of a 'high-road' strategy of investing in high-quality education, innovation and productivity gains. Although the starting point for this change was an economy that already exhibited a comparatively high level of quality of work, products and services, and although there have been some

countervailing measures – such as a statutory minimum wage and the reregulation of temporary work and contract labour – the downward trend in job quality is nonetheless now well-established. This can also be seen in more recent developments, particularly employers' reactions to a new wave of digitisation and digital interconnectedness.

Changes in the workplace, for the many and the few

For an increasing number of knowledge workers, the dissolution of boundaries between work and leisure time is already a reality. Equipped with laptops and smartphones, they can work at home or in a café almost as well as they can in a traditional office – and increasingly often they do (Schwemmle and Wedde 2012). This facilitates new liberties and opportunities to reconcile work requirements with personal and family circumstances, but it also brings with it the danger of transforming the opportunity to work anywhere and anytime into the *duty* to work everywhere and always – a risk that is confirmed by trade union surveys (see DGB 2014).

New processes and technologies mean that knowledge-intensive services, like financial advice or employment services, are experiencing a major restructuring. As algorithms become the basis for operational decision-making, whole new divisions of tasks are created, simultaneously devaluing the skills of many employees and valorising those of the few who design and refine these processes. In commerce, retail and logistics, digitalised and automated merchandise planning and control systems are being tested which reduce the demand for routine work and labour in general, but increase the need for the remaining employees to have higher-level skills in complex problem-solving (to resolve unexpected glitches in the new systems). Previously comprehensive company value chains are being split into two, with core businesses and staff on one side and peripheral contractors on the other. More sophisticated benchmarking systems aim to further increase efficiency and externalise costs, demanding ever-higher commitments from regular employees and at lower levels of compensation, while an increased use of contracted labour is fostering a cadre of the 'quasi self-employed', reducing security for these individuals and generating even greater inequality among staff who are fulfilling identical tasks.

Similar trends can also be seen in sectors where, due to Germany's ageing population, employment is widely projected to grow in the future. Personal services in health and care are already suffering from an increasing lack of good jobs and decent work. Strong driving factors here include institutional and financial restrictions imposed by the health insurance system and the ideology of 'lean government', which sees public services primarily as 'cost factors'. Here, wage competition is becoming dominant, driven both by liberalisation and deregulation (Bräutigam et al 2014).

These emerging trends in the German world of work point to a scenario in which the mid-level qualifications and skills needed for routine cognitive and manual tasks become less valuable, while high-skilled employees with analytical, creative, communication and interpersonal talents can improve their material bargaining position (although not necessarily with regard to control over their own free time), and prospects for the long-term unemployed are poor, and may well deteriorate further. It is already the case that high-quality education and vocational training are the *sine qua non* for an individual's sustainable economic participation. However, the time has gone when a formal degree (even a European-style dual vocational training or an academic degree) is any guarantee of decent and decently paid work – let alone a stable job. Addressing these challenges and pushing for economic development benefitting the majority requires not only a focus on individual skills and qualifications but a more comprehensive perspective on the conditions of employment in their entirety.

'The humanisation of work': identifying progressive policy options

Maintaining a firm's competitiveness is probably the most common justification given for changing job specifications, making redundancies or devising new roles. However, whether that firm pursues a low-road or high-road approach in its quest for competitiveness makes a huge difference in terms of the consequences for its workers. In recent years, Germany's competitiveness model seems to have focussed primarily on reducing costs, particularly with regard to the cost of labour, including social security costs (*Lohnnebenkosten*) and labour rights. If increases in hourly labour productivity are the key to prosperity in the long term, then the performance of Germany's economy since the beginning of the new millennium is worrying – indeed, it is below average, compared to similar developed economies like those of France, Sweden or the US (Van Ark et al 2009).

Instead, it is time for a greater focus on high productivity and quality jobs, promoting 'good work' for the benefit of the majority. There needs to be regulation to ensure that social and employment standards do not become mere 'adjustment variables' in the competition between firms (see Degryse et al 2013). The foremost requirement is to counteract the trends towards informal working and precarious work. In the German context, this means restricting mini-jobs, ensuring equal pay and fair conditions for temporary contract workers, and protecting and expanding the prospects for this group to negotiate collective agreements.

In those sectors where technological progress in the form of digitisation and digital interconnectedness has already blurred the

boundaries between work and leisure, the issue of 'time sovereignty' looms largest, alongside struggles over workload and labour intensity (see Meine 2015). Once the question of hourly minimum wages has been addressed, it is likely that performance policy (*Leistungspolitik*, or 'power politics') will be one of the major new areas of contention, as well as the extension of shared employer-employee decision-making to a wider range of operational and even managerial decisions, as seems advisable for both normative and technical reasons (see Roth and Muller 2015).

One of the most important lessons to be learned from Germany's performance in the early stages of the economic crisis, when demand for many German products was falling, centres on labour market flexibility, in a broader sense than is traditionally meant. What enabled Germany to weather the storm better than most, in terms of employment levels, and to fare well in the recovery were a number of mechanisms that effectively acted as a buffer between the labour market and fluctuations in the demand for goods and services. These included public subsidies to the wage bills of companies most severely affected and existing collective agreements between the social partners. However, these mechanisms protected core employees better than those in peripheral jobs. Increasing uncertainty and instability in business and work has reinvigorated a debate among German social democrats and trade unionists the need for a new kind of 'labour insurance' (*Arbeitsversicherung*) to protect workers against unemployment, provide periods of advanced training, and facilitate switches between employment and self-employment (see Rahner 2014).

Digitisation, digital interconnectedness, automatisation and robotics continue to increase the relative demand for 'non-routine' abilities – including analytical, creative, problem-solving, interpersonal and communication skills – meaning life-long learning becomes more and more important. An increasingly flexible workforce, constantly pushed to its limits, is unlikely to provide the advanced training that an individual needs over their (possibly prolonged) working life. As a response, any 'performance policy' has to be accompanied by improvements in advanced vocational training, and so universities – including universities of applied sciences and comprehensive universities – should be made more accessible not only for initial training but also for ongoing and advanced professional training. Future labour market trends are likely to demand a shift in workers' focus from workplaces and related skill-requirements to their own working lives and 'employment biographies' – in other words, a rethinking of what a 'career path' means (see IG Metall 2014).

In many areas it is already clear what has to be done. Other questions are more open, including what can be considered a sustainable 'normal workload' with regard to the processing of information and how a new model of 'standard employment' could be designed

and socially secured, given the increasing diversity of lifestyles and organisational and technological possibilities. The time is, therefore, ripe for a modern programme for the humanisation of work, which should take into account not only the situation and developments in Germany, but in Europe as a whole.

References

Bräutigam C, Evans M, Hilbert J and Öz F (2014) *Arbeitsreport Krankenhaus*, Hans Böckler Stiftung. http://www.boeckler.de/pdf/p_arbp_306.pdf

Dauderstädt M (2013) 'Deutschland – ein Wundermärchen', WISO direkt, Friedrich Ebert Stiftung. http://library.fes.de/pdf-files/wiso/10164.pdf

Degryse C, Jepsen M and Pochet P (2013) *The Euro crisis and its impact on national and European social policies*, European Trade Union Institute [ETUI]. http://www.etui.org/content/download/11580/97331/file/13+WP+2013.05+Crisis+impact+social+policies+Web+version.pdf

DGB (2014) *Index Gute Arbeit. Der Report 2014 – Mit dem Schwerpunkt Arbeitszeitgestaltung*. http://index-gute-arbeit.dgb.de/++co++8192de46-7a3e-11e4-b422-52540023ef1a

DGB Jugend (2014) *Ausbildungsreport 2014.* http://jugend.dgb.de/meldungen/ausbildung/++co++ca0324b4-3287-11e4-9c58-525400808b5c

IG Metall (2014) *Fachkräfte sichern! Gute Strategien zur Umsetzung*. http://www.igmetall.de/internet/docs_IGM_Fachkraefte_sichern_6b88848e3dfaa3eb105cbbdacadd23180cbc0012.pdf

Meine H (2015) 'Mitbestimmung über die Leistungs – und Personalbemessung – auf dem Weg zu einer neuen Leistungspolitik', in Schröder L and Urban HJ (eds) *Gute Arbeit. Qualitative Tarifpolitik – Arbeitsgestaltung – Qualifizierung*, Bund-Verlag. http://www.bund-verlag.de/shop/neuerscheinungen/gute-arbeit-ausgabe-2015.html

Rahner S (2014) *Zukunftsaufgabe Weiterbildung. Stand der Debatte und internationale Anknüpfungspunkte zur Entwicklung einer Arbeitsversicherung*, WISO Diskurs, Friedrich Ebert Stiftung. http://library.fes.de/pdf-files/wiso/11104.pdf

Roth I and Müller N (2015) 'Innovationen fördern durch ein gutes Lernklima', in Schröder L and Urban HJ (eds) *Gute Arbeit. Qualitative Tarifpolitik – Arbeitsgestaltung – Qualifizierung*, Bund-Verlag. http://www.bund-verlag.de/shop/neuerscheinungen/gute-arbeit-ausgabe-2015.html

Schwemmle M and Wedde P (2012) *Digitale Arbeit in Deutschland. Potenziale und Problemlagen*, Friedrich Ebert Stiftung. http://library.fes.de/pdf-files/akademie/09324.pdf

Stein U, Stephan S and Zwiener R (2012) *Zu schwache deutsche Arbeitskostenentwicklung belastet Europäische Währungsunion und soziale Sicherung*, Institut für Makroökonomie / Macroeconomic Policy Institute. http://www.boeckler.de/pdf/p_imk_report_77_2012.pdf

Van Ark B, Jäger K, Manole V and Metz A (2009) *Productivity, performance, and progress: Germany in international comparative perspective*, WISO Diskurs, Friedrich Ebert Stiftung. http://library.fes.de/pdf-files/wiso/06289.pdf

2.3
CONTINUITY AND CHANGE IN THE GERMAN LABOUR MARKET

DAVID BRADY, THOMAS BIEGERT AND SIGURT VITOLS
WZB Berlin Social Science Center

The German labour market has long been admired for its robust institutions, its vocational training and apprenticeship systems, which produce skilled and productive workers, and its relatively strong performance in delivering stable and secure careers. However, Germany has experienced a variety of economic, political, policy and institutional transformations in recent years and, as a result, its labour market has undergone many changes. This chapter offers an analysis of the contemporary German labour market, and how it changed between 1984 and 2010. Using data from the German Socio-Economic Panel made available through the Luxembourg Income Study, we analyse five labour market outcomes and a series of sociodemographic and employment-related variables.

The analysis reveals a number of important descriptive trends. The only improving trend is in the rise of the employment rate among working-age adults. On the other hand, some labour market outcomes – in particular, part-time employment and the share of low-wage employment – have grown much worse. There has also been a large increase in wage and earnings inequality. These changes have occurred at the same time as women's labour force participation has increased; migrants have remained a relatively stable share of employees; and there have been substantial improvements in the education and skill composition of the labour force.

There are also clear and relatively stable regional differences within Germany. In general, the former states of eastern German perform worse on nearly all labour market outcomes, and the southern states (especially Baden-Württemberg) perform best.

The current German labour market

Generally, the relationships between sociodemographic variables and labour market outcomes are unsurprising, but there are some that are not in line with expectations. Across four out of five measured labour market outcomes, women are disadvantaged relative to men, even after allowing for any differences in other variables (such as age, education levels and experience). The one exception is that women are not more likely to be on temporary contracts than men. The other four are employment, part-time and temporary working, low-wage working and wage growth.

People born outside Germany are significantly less likely to be employed, but are also significantly less likely to be in part-time employment, and significantly less likely to be low-wage workers. Having a young child in the household is significantly negatively associated with employment, and significantly positively associated with part-time and low-wage employment.

Young adults (aged 18–24) experience some advantages and disadvantages. They are more likely to be employed and less likely to be working part-time. However, they are more likely to be temporarily employed and more likely to be low-wage employees.

People with few or no qualifications are significantly less likely to be employed and more likely to have low hourly wages if they are in work. However, they are also significantly less likely to be part-time employees and not significantly different in terms of temporary and low-wage employment. Labour market outcomes are better for those with vocational training experience than for those with medium-level qualifications but without vocational training. Those with higher education have the best labour market outcomes across all five outcomes.

Trends in the labour market

Over time, there have been some important changes to how the sociodemographic and employment-related variables are associated with labour market outcomes. Our analysis shows women have become more likely to work, but have experienced a slightly increased disadvantage in terms of part-time and low-wage employment. At the same time, young adults have become increasingly less likely to be employed.

We also find that those with vocational training or higher levels of education have becoming increasingly advantaged. Comparing 2010 with 1984, there appear to be increasing returns to education and training. While there have always been advantages to education and training, workers with a low or medium level of education and no vocational training have become increasingly disadvantaged.

Most other key predictors have had relatively stable effects over time. There has been no clear change in the effects of being born outside Germany, age, industry or occupation on labour market outcomes. Even for young workers, there are no major changes over time in four of the five labour market outcomes. Moreover, we do not find fundamental changes in the traditionally successful domains of the German labour market, namely manufacturing and skilled workers.

Addressing three contemporary issues

This analysis can inform the debates around three contemporary issues in the German labour market: the effect of policy reform, the growth of precarious work and the tendency towards dualisation.

We have data for 2004 and 2007, immediately before and soon after the Hartz reforms to the German labour market were implemented, which allows us to gauge the effects of these reforms. The Hartz reforms coincided with rising employment, and there was not a clear increase in temporary employment between 2004 and 2010.[1] Also, hourly wages rose between 2004 and 2010. However, since the reforms came into effect, there has been a clear increase in low-wage employment and wage and earnings inequality.

Consistent with the work–family aspect of the reforms, women were more likely to be working in 2010 than in earlier decades. There has also been an increase in part-time employment, which the reforms guaranteed as a right. However, women experience growing disadvantages relative to men in other labour market outcomes. Although there has not been a rise in part-time employment overall, women are increasingly more likely to be working part-time, which suggests strong – and potentially growing – gender segregation. There is also a clear disadvantage for women to having a young child in the household: work–family policies enable employment but have not gone far enough to remove disadvantages to parenting, a burden that falls disproportionately on women. While the policy changes provide state- and employer-funded benefits for working families, employers have not become less discriminating against women and mothers. The rising disadvantages that employed women experience are consistent with at least some increase in discrimination.

A second major narrative in discussion of the German labour market has been the growth in precarious working. More specifically, there is a view that deregulation, increased business power and weakening labour market institutions, social policies and unions have all worsened the standing of workers.

1 It is important to be cautious with the 2010 time point as falls squarely within the 'Great Recession'. However, as this analysis concentrates primarily on longer-term trends, our conclusions do not rest solely on the 2010 data.

There is some evidence for a prevailing trend towards precariousness. Unionisation has declined precipitously in Germany; young adults are having greater difficulty finding employment; and the rise in part-time employment is not encouraging, even if it reflects work–family reconciliation and some degree of personal choice. More importantly, there have been significant increases in low-wage employment and in wage and earnings inequality. On the other hand, it is difficult to decisively conclude that the labour market is getting more precarious when employment and hourly wages are increasing significantly. Moreover, there is a lot of stability and continuity in labour market outcomes.

The third narrative centres on dualisation, and contends that the labour market is being increasingly divided into 'insiders' and 'outsiders', who are granted different levels of access to labour markets, institutions and social policies. While the German labour market might benefit older, male, native workers, it excludes and marginalises the young, women, the less skilled and immigrants. Indeed, the argument has been that the exclusion of such groups is what has allowed the German system to maintain generous wages, benefits, protections, and social policies for the insiders – especially in an era of financial austerity and following reunification.

The strongest evidence for dualisation is the significant increases in part-time employment, low-wage work and wage and earnings inequality. Particularly indicative of dualisation are the increasing disadvantages that employed women experience, and the fact that young adults have become increasingly less likely to be employed. Equally relevant are the persistent advantages of skilled workers: those with vocational training, and those in the public sector or mining/manufacturing industries. That Germany's traditionally successful workers are clearly insiders and continue to be 'winners' means that the outsiders and 'losers' include the less skilled, and those without vocational training working in the service sector. Workers with low- or medium-level qualifications and no vocational training have become increasingly disadvantaged. Meanwhile, the German labour market has substantially improved for those with a university education. That this improvement has coincided with rising low-wage employment and inequality suggests that many workers are excluded and marginalised.

However, some evidence is more ambiguous. Migrants are disadvantaged, but this disadvantage has not increased over the period when dualisation was supposedly becoming more pronounced. Although women face increasing disadvantages in the labour market, more women have been able to work than in the past, which makes it hard to see them, as a group, as outsiders. Temporary employment has not increased. Against four of the five labour market outcomes, young workers are not doing any worse in 2010 than they were in

1984. Finally, the key institutions of education and training, which might be supposed to sort workers into insiders and outsiders, have arguably become less exclusive over time.

Overall, there is some evidence to support each of these three narratives about the German labour market, but in no case it is overwhelming. The concept of dualisation arguably best describes the changes in the German labour market, but at the same time one should keep in mind the stability and robustness of the German model.

That said, despite an increase in the average skill level of the German workforce, there has been an increase in part-time work, in low-wage employment and in wage inequality. This is the downside of increased labour market flexibility. At the margin, firms appear to have taken a 'low road' to more low-productivity, low-value-added, low-paid work, rather than a 'high road' characterised by the opposite. The lesson for Germany – and for other European countries – is that simply supplying skills to a flexible labour market is not by itself an adequate response to structural change in the economy. More needs to be done to encourage and support firms to move towards a high-productivity model so that they can offer more, better-quality jobs.

3.1
BRIDGING THE SKILLS GAP

THOR BERGER AND CARL BENEDIKT FREY
Oxford Martin School, University of Oxford &
Department of Economic History, Lund University

In recent decades, European labour markets have witnessed substantial disruption as the workplace has been restructured to accommodate the arrival of digital technologies. Since the 1980s, these technologies have substituted for many routine jobs, particularly those involving rule-based activities, which can easily be specified in computer code. By contrast, newly created jobs have typically become more cognitive in nature, raising the demand for workers with problem-solving, creative and social skills. Looking forward, the digitisation of the economy will further alter the skills needed at work. A key challenge for governments around Europe is to help workers who are made redundant to transition into new types of jobs.

The expanding scope of automation

In the past, automation was largely confined to middle-income routine manufacturing and clerking occupations, but things are changing. Now, technological advances are likely to increase the pressure on workers at the lower end of the skill distribution. As the scope of automation expands rapidly to include a wide range of unstructured or non-routine tasks, many of the old 'safe havens' for low-skilled workers are likely to disappear. The prospect of driverless cars proves the feasibility of automating many occupations in the transport and logistics sector; increasingly sophisticated algorithms for big data make it feasible to computerise many office and administration jobs; and recent advances in the sensing capabilities of robots may enable the substitution of labour across a swathe of service occupations.

Against the background of such technological breakthroughs, a study by one of the authors (Carl Benedikt Frey) and Michael Osborne predicts that 47 per cent of US jobs are at 'high risk' of being automated within the next decade or two (Frey and Osborne 2013). In particular, workers in transportation and logistics, as well as a wide range of production, office and administrative support workers, are at risk of being replaced by computer-controlled equipment.

Bruegel, a European thinktank, applied these estimates to employment data for the EU28, showing that a similar share of European jobs is at risk. Their estimates show that countries such as Belgium, Germany and Sweden have a similar exposure to the US, but they also suggest that countries in the European periphery are likely to see more substantial job losses in the near future, reflecting their higher share of low-skilled work (Bowles 2014). Although relative costs matter, which means that the substitution of labour in low-wage countries may take some time, the consequences for countries with less extensive social security systems are potentially even more disruptive. In coming decades, anywhere from 45 per cent to well over 60 per cent of European workers could see themselves displaced due to computerisation. With some 24 million of Europe's workers currently unemployed (Eurostat A), these predictions suggest daunting labour market challenges ahead.

Challenges for low-skilled workers

As the scope of workplace automation expands, workers will have to find other types of jobs that are less amenable to computerisation. In the same way that workers have adapted to technological upheaval in the past by developing skills that are complementary to new technologies, so the workers of the future will have to adapt as well. The crucial question, then, is what skills they will have to acquire.

According to a survey carried out by the European Centre for the Development of Vocational Training in Germany, Hungary, the Netherlands and Finland, some 25 per cent of workers will experience skill obsolescence, and 16 per cent of workers believe that technological advances have made their skills obsolete within the last two years (Cedefop 2012). The skill-sets identified as most critical are the ability to speak other languages and computer and ICT skills. Skill obsolescence is particularly evident among low-skilled workers, exacerbating the increased susceptibility to automation in many such jobs. According to the same study, about one in three low-skilled workers also experience a lack of skill development in their careers, suggesting that directed efforts will be needed to help displaced low-skilled workers transition into new types of work.

Furthermore, as digital technology becomes more heavily integrated into the daily operations of firms across a wide range of industries, digital literacy will become critically important for the vast majority of workers. Yet, according to the European Commission, some 47 per cent of European workers have insufficient digital skills, with 23 per cent having none at all. Moreover, large differences exist between countries: in Sweden, just 6 per cent of the population has no digital skills, whereas every second Romanian lacks them (European Commission 2014). At the same time, the demand for workers with ICT skills grows by about 4 per cent annually, which could result in

as many as 900,000 vacancies in ICT jobs by 2020 (ibid), pointing to substantial challenges for policymakers in promoting the broad development of digital skills in Europe.

To bridge the skills gap, the educational system should be aligned to provide students with basic digital and ICT skills. Such initiatives are currently being undertaken in several European countries. In 2014, British schools, for example, introduced coding as part of the curriculum for children aged five and above. This involves learning about algorithms, how to code simple programs and logical reasoning. Integrating digital skills in the curriculum early on will be crucial for maintaining a competitive labour force in the future, something that has been recognised by the launch of the European Commission's Grand Coalition for Digital Jobs, which emphasises the need for embedding basic ICT training throughout the European educational system.

Yet, a narrow focus on digital skills will not be enough. As technology races ahead, the digital skills of today are likely to be obsolete sooner than we may think. More broadly, educational efforts should aim to provide workers with integrated skill-sets of technical, creative and social skills – that is, in areas where human workers are likely to retain a comparative advantage despite the inroads which have been or will be made by computers. Historically, great innovations have come from people who have successfully combined technical know-how with creativity, which suggests that building bridges between technology and the arts might also prove crucial for future competitiveness.

Skills in the future of work

Jobs that are not at risk of computerisation have something in common: they require an understanding of human heuristics or involve the creation of novel ideas – that is, they require social or creative skills. Many jobs in management, education or healthcare that involve social interaction, therefore, are unlikely to be automated. Similarly, science or engineering jobs that require creative skills will probably not see substantial job losses due to technological advances in the near future.

Beyond simple job security, creative and entrepreneurial skills are also critical in identifying and exploiting economic opportunities in the digital age. Consider, for example, the rise of the app industry, created in the wake of Apple's introduction of the iTunes store in 2008. Research from the European Commission's digital unit shows app developers could quadruple their earnings, from roughly €17.5 billion to €63 billion, over the coming five years. At the same time, the app-developer workforce, including support and marketing staff,

is projected to grow from roughly 2 million today to 4.8 million in 2018 (Mulligan and Card 2014).

Another sign of the increased role of creative and entrepreneurial skills is the proliferation of microbusinesses and the rise in self-employment, enabled by the spread of digital peer-to-peer platforms. Etsy, for example, provides an online marketplace for its 1 million sellers to offer vintage or handmade art, clothing or jewellery to some 30 million registered users. Airbnb allows individuals to offer accommodation services, with more than 800,000 listings in 33,000 cities all over the world. In several of Europe's largest cities, 'freelance taxi' company Uber provides an increasing share of transportation services. New business opportunities of this kind are reflected in a substantial increase in self-employment in most European countries. In the UK, for example, some 4.5 million workers—about one in seven—are currently self-employed, the highest share since data first began to be collected 40 years ago (ONS 2015).

More generally, digital technology has made self-employment a more attractive option because it provides entrepreneurial opportunities characterised by low start-up and marketing costs, and unprecedented access to information, capital and customers. As the digital economy of micro-entrepreneurs, contract-based workers and freelancers continues to expand, it will not only change the very nature of work, but also require that we promote the development of entrepreneurial capabilities themselves, in order to increase workers' understanding of how their skills might be applied to start thriving businesses.

'Work' in an age of rapid change

As a wide range of traditionally middle-income work has disappeared in the wake of technological advances in computing and industrial robotics, the broadly shared fortunes of the 20th-century labour market have retreated to the extremities. Over the next decade, the computerisation of middle-income jobs will shift to mainly substituting for low-income workers, while the demand for problem-solving, creative and social skills is likely to increase further. To make sure that the benefits from technological advancements benefit ordinary workers, efforts must be directed towards upgrading the digital skills of a large part of the workforce. Furthermore, to ensure that workers remain attractive to employers in the digital age, European policymakers should focus on fostering creative and social skills because these are areas where humans are likely to retain a comparative advantage over the increasing number of their automated, robotic or virtual colleagues.

References

Bowles J (2014) 'The computerisation of European jobs – who will win and who will lose from the impact of new technology onto old areas of employment?' Bruegel blog, 17 July 2014. http://www.bruegel.org/nc/blog/detail/article/1394-the-computerisation-of-european-jobs/

Cedefop (2012) Preventing skill obsolescence. http://www.cedefop.europa.eu/en/publications-and-resources/publications/9070

European Commission (2014) 'Digital Inclusion and Skills', Digital Agenda Scoreboard 2014. https://ec.europa.eu/digital-agenda/en/news/scoreboard-2014-digital-inclusion-and-skills-eu-2014

Eurostat (A) 'Harmonised unemployment by sex', dataset. http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=teilm010&plugin=1

Frey CB and Osborne M (2013) 'The future of employment: how susceptible are jobs to computerisation?', Oxford Martin School. http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Mulligan M and Card D (2014) 'Sizing the EU app economy', Gigaom Research. http://ec.europa.eu/digital-agenda/en/news/sizing-eu-app-economy

Office for National Statistics [ONS] (2015) 'UK Labour Market, January 2015', statistical release, 21 January 2015. http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/january-2015/statistical-bulletin.html

3.2
IN THE FUTURE, WHAT WILL PEOPLE DO?

STEVE BAINBRIDGE
Cedefop (European Centre for the Development of Vocational Training)

It was a sin; perhaps two. No one goes to Paris to eat at McDonald's, and I felt guilty eating ice-cream at midnight. But I was just one person in a long queue. To avoid waiting, people could opt to order their food using a touchscreen, pay for it with a credit card, and collect it from the counter – but they did not. Like me they preferred to wait and speak to the polite assistant (probably an undergraduate) at the cash till. Fastfood restaurants no longer *need* people at the counter, just as supermarkets don't need people to operate their checkouts. Technology can do these tasks. But these jobs still exist, largely because people need other people. Perhaps this is a reason why, ever since the Luddites set about smashing the machines of 19th-century England, predictions about technology destroying jobs have proved inaccurate.

People need people: the value of quality service and human interaction

In the late 1970s, banks in the UK introduced automatic cash machines and cut staff, closed branches and reduced opening hours. Technology cut costs. But working people could only get into the bank at lunchtime when they needed other banking services. They would find only one window open, as most bank staff were taking their own lunch breaks. Now cash machines are everywhere, but you can also call some banks around the clock. Branches are open for longer hours, some on Saturdays, with nice people to help you – not so much with cash deposits and withdrawals, but with advice about mortgages, loans and savings.

Technology has always changed the nature of work, but demand for workers has continued to increase. Admittedly, technology now is more far-reaching. As Berger and Frey note in the previous chapter, around 47 per cent of US employment could be at high risk of being automated out of existence over the next 10 or 20 years (Frey and Osborne 2013), and it is unlikely that the picture is very different in

Europe. But there are reasons to be optimistic about future demand for people. Prior to the economic crisis in 2008, despite advances in new technology, the EU was enjoying a record employment rate of 65.7 per cent (Eurostat A). Although the region lost around 7 million jobs between 2008 and the depth of the crisis in 2010 (Eurostat B), this fall was not as bad as many had feared. Job growth is now expected to return to the EU, although rates vary markedly across countries (Cedefop 2015 forthcoming).

The loss of manufacturing jobs in the EU appears to have largely stopped (Cedefop 2013a). Meanwhile, skill shortages continue to exist. Demand for skilled tradespeople, such as plumbers and electricians, remains high. Employers have also expressed concerns about shortages of graduates in the STEM subjects – science, technology, engineering and mathematics – not least in Germany (Deutsche Bank 2012) and the UK (Engineer 2012).

Technology can also create jobs. It enables enterprises to make existing products better and more efficiently, and to make new things. Technology also brings down barriers to entry. Skype software was developed in Estonia in 2003 and only acquired by technology giant Microsoft in 2011 for $8.5 billion. Small firms and individuals are already publishing and distributing books and music via the internet and creating apps for smartphones, computers and enabled TVs. Three-dimensional printing enables bespoke manufacturing by small firms. Aside from opening up opportunities, lowering barriers to entry also reduces risk and so may increase the number of budding entrepreneurs starting businesses, perhaps encouraged by online or 'crowdfunding' sources like Kickstarter.

Another reason for optimism about demand for human workers is that, increasingly, they provide the competitive edge. Price and quality will always be important, but they are now expected. Competition lies in the quality of service that only people can deliver, because people are prepared to pay a little more for quality service and positive interaction (Berry et al 1994, Oracle 2011). Fastfood restaurants without frontline staff would soon lose customers to competitors who have retained their human face. Banks need staff to attract savings by giving people information and reassurance. Manufacturers and service providers compete by developing personal relationships with customers. For that you need people.

The new skills for people who deal with people

Technology is good at replacing routine tasks, and there is no direct link between skill level and routine (Cedefop 2013a). Low-skill production-line manufacturing jobs may be routine, but the internet is replacing medium-level clerical jobs too, as people make purchases and applications online. Technology is also affecting high-skilled jobs:

aeroplanes without pilots (drones) are already more widely used than cars without drivers, and most routine financial trades are processed by technology, without human intervention.

In the future, work will be more networked and less rigidly focused on a specific workplace or around fixed working hours (Störmer et al 2014). Already around 5 million people work shifts in the UK, and estimates are that half of all London night-time bus passengers are travelling to or from work (Economist 2014). Longer working lives, whether due to national changes to the retirement age or individual circumstances, also mean that four generations could be working at once (Störmer et al 2014).

And most people will be working in services that indirectly or directly improve their clients' quality of life, such as health, social services, tourism and education: jobs where people deal with people. Consequently, jobs of the future will require people to think, communicate, organise and deal with varied non-routine tasks. Workers will need to be adaptable and able to learn new ideas, methods or techniques. Moreover, employers will be seeking these skills to differing degrees in all types of jobs, at all levels. Foreign languages and advanced reading and writing skills are not only required by professionals but increasingly, for example, by personal care workers, many of whom have not traditionally been highly qualified (Cedefop 2013b).

Nevertheless, even if there are jobs available, concerns remain that technology is racing ahead, and that skills, organisations and institutions need updating more rapidly (Brynjolfsson and McAfee 2014). Despite high unemployment, employers complain that they cannot find the skills they want (Manpower 2013). Not everyone will need a PhD to find a job, but upper-secondary-level education is rapidly becoming the minimum required to have any reasonable job prospects, and skills will need to be updated throughout an individual's working life.

Adapting to disruption: the power of technology to help boost skills

Over 10 years ago, confronted by various socioeconomic challenges, including technological progress, the European Commission, EU member states and social partners agreed to cooperate to improve vocational education and training (VET) across the EU, under the 'Copenhagen process'.[1] The objectives of this process are to improve alignment of VET provision with labour market needs, make systems more flexible, encourage mobility

1 See http://ec.europa.eu/education/policy/vocational-policy/doc/copenhagen-declaration_en.pdf

for learning and working, raise VET's status (emphasising its role in economic excellence, not just social inclusion) and increase participation of adults in lifelong learning. The process is regularly monitored and progress has been made. The shift to basing VET curricula on learning outcomes (a person's resulting capabilities) rather than learning inputs (duration and place of study) has opened up different ways to acquire skills. Better methods of validation mean that learning, no matter how it is acquired, can lead to recognised qualifications. And instruments such as the European qualifications framework and certificate and diploma supplements are designed to make it easier to understand qualifications from other countries to support studying and learning abroad.[2]

These developments are changing VET substantially. A greater emphasis on core, transferable knowledge, skills and competencies means that VET is seen less as a specific learning track and more as one part of a broader learning system. Labour market-oriented learning is also being offered at all qualification levels, by a wider range of institutions, including higher education.

These changes have made some difference. More young people now stay on in education and training to at least upper-secondary level, and the EU is on course to meet its target of reducing early school-leaving to an average of 10 per cent by 2020 (Cedefop 2013a). By 2025, around 40 per cent of the EU workforce will have a tertiary level qualification (ibid), although this average will mask considerable variation between countries. But reform still has a long way to go and, following the economic crisis, there is uncertainty about sustaining momentum and investment in change. Vocational learning needs to reflect more clearly the wider trends towards greater flexibility in the workplace, and be less constrained by place, time and – importantly – age. It should be easy for someone to qualify in a trade, craft or profession at any point in their career.

Here, technology can help. Informal education, much of it vocational, is widely available online. 'Massive open online courses', or MOOCs, are improving and expanding. Online learning offers flexibility and can be significantly cheaper, making new skills and knowledge more accessible and allowing learners to experiment with different subjects. But technology is a complement to high-quality teachers and trainers, not a reason to replace them. Valuable knowledge and experience are stored in people, and information is often a matter of interpretation. We need wise minds, not machines, to guide us through the maze of facts and figures. In education, as in the wider labour market, we will continue to need *people*.

2 For more on the objectives of the Copenhagen process, see Cedefop 2010; on the shift from inputs to outputs, see Cedefop 2009; and on the European qualifications framework, see Cedefop 2012.

Technology is often disruptive, but in the long run generally beneficial. Despite continued technological advance, there is cause for optimism that future employment rates in Europe will be high. Today's enterprises should not repeat the mistake of the banks in the 1970s in believing that technology is a substitute for people. Relationships with current or potential customers can make or break a business. However, for people and technology to be compatible, we need an education and training system that provides people with strong core skills and opportunities to acquire a varied skill-set with relative ease. Creating such a system remains a work in progress.

References

Brynjolfsson E and McAfee A (2014) *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technology*, WW Norton & Co

Berry LL, Parasuraman A and Zeithaml VA (1994) 'Improving service quality in America: Lessons learned', *Academy of Management Executive*, 8(2)

Cedefop (2009) *The shift to learning outcomes: policies and practices in Europe*. www.cedefop.europa.eu/files/3054_en.pdf

Cedefop (2010) *A bridge to the future: European vocational education and training policy 2002-10*. www.cedefop.europa.eu/files/3058_en.pdf

Cedefop (2012) *Qualifications frameworks in Europe: an instrument for transparency and change*. www.cedefop.europa.eu/files/9071_en.pdf

Cedefop (2013a) *Roads to recovery: three skill and labour market scenarios for 2025*. http://www.cedefop.europa.eu/node/11926

Cedefop (2013b) *Piloting a European employer survey on skill needs: Illustrative findings*. www.cedefop.europa.eu/files/5536_en.pdf

Cedefop (2015 forthcoming) 'Skill supply and demand forecast'

Deutsche Bank (2012) 'New stimulus for Germany's skilled workers market', Talking Point blog, 30 May 2012. http://www.dbresearch.com/servlet/reweb2.ReWEB?addmenu=false&document=PROD0000000000288952&rdShowArchivedDocus=true&rwobj=ReDisplay.Start.class&rwsite=DBR_INTERNET_EN-PROD

Economist (2014) 'After Dark', 4 October 2014. http://www.economist.com/news/britain/21621854-london-becoming-24-hour-city-after-dark

Engineer (2012) 'Report reveals scale of UK's engineering skills shortage', 1 October 2012. http://www.theengineer.co.uk/channels/policy-and-business/report-reveals-scale-of-uks-engineering-skills-shortage/1014081.article

Eurostat (A) *Employment – LFS adjusted series*, accessed 10 November 2014. http://ec.europa.eu/eurostat/web/lfs/data/main-tables

Eurostat (B) *Unemployment – LFS adjusted series*, accessed 10 November 2014. http://ec.europa.eu/eurostat/web/lfs/data/main-tables

Frey CB and Osborne M (2013) 'The future of employment: how susceptible are jobs to computerisation?', Oxford Martin School. http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Manpower (2013) *Talent Shortage Survey Research Results 2013*. http://www.manpowergroup.com/wps/wcm/connect/manpowergroup-en/home/thought-leadership/research-insights/talent-sources/2013-talent-shortage#.VMeqsmisV8E

Oracle (2011) *2011 Customer experience impact report: Getting to the heart of the consumer and brand relationship.* http://www.oracle.com/us/products/applications/cust-exp-impact-report-epss-1560493.pdf

Störmer E, Patscha C, Prendergast J, Daheim C, Rhisiart M, Glover P and Beck H (2014) *The Future of Work: Jobs and Skills in 2030*, UK Commission for Employment and Skills [UKCES]. https://www.gov.uk/government/publications/jobs-and-skills-in-2030

The views expressed in this article are those of the author and do not necessarily reflect those of Cedefop.

3.3
COLLECTIVE INTELLIGENCE: QUESTIONING INDIVIDUALISED APPROACHES TO SKILLS DEVELOPMENT

STEFANA BROADBENT
Nesta

When thinking of the future of work in Europe, automation and 'robotisation' are often invoked as probable developments that will lead to the replacement of humans and a progressive reduction in the numbers of people in employment. Robotisation in particular is presented as a technology of replacement, leading to inactivity and exclusion. However, if we consider the changes that we are already seeing in the labour market, it is not exclusion and inactivity that are on the rise, but self-employment, instability, fragmentation and precariousness. Years of automation and digitisation have not excluded human beings from the work process, but instead have reconfigured their activities and their lives.

How technology creates labour market uncertainty

It is increasingly common for an individual to experience periods of employment followed by periods of unemployment, followed by partial employment; or to take on multiple jobs, freelancing, temporary and part-time work, and self-employment. There is general agreement that we can expect even greater precariousness in the jobs market, which in turn will generate instability in individuals' income, professional development and mobility. Indicators published for the UK by the Office for National Statistics – such as the length of time individuals are unemployed (two-thirds of jobseekers are unemployed for less than 24 weeks), the proportion of people who are underemployed (9.2 per cent) and the decrease in voluntary job turnover (ONS 2014) – all suggest that workers are already living with a considerable degree of uncertainty. Traditional 'linear' careers are increasingly the exception, and most people have a myriad of employers, jobs, roles and skills on their CVs.

The question, therefore, is not how to prevent or minimise the potential replacement of humans by increasingly integrated information systems, but rather how to handle the instability and uncertainty they create. Somewhat paradoxically, one of the shortcomings of automated systems and robots has been, until recently, their very stability. Automation started by replacing highly routine tasks, and it still works best in stable and predictable environments. Even in much more advanced systems, where machine learning can support adaptation to less fixed, more unpredictable situations, interaction with humans still speeds up the process of learning how to disambiguate contextual information. This may change again in the future, as machine learning becomes more sophisticated and interacts with even greater quantities of data.

The prognosis is similar for human workers. Projections of which sectors are likely to produce reliable jobs growth tend to focus on creative activities, soft relational tasks, managerial and coordination roles, all of which involve creating new meanings, interpreting contextual conditions and generating alternative, potentially unpredictable, solutions. Creativity and innovation rely on the capacity to frame problems differently and to integrate diverse, occasionally conflicting points of view. Managing instability and uncertainty are, therefore, going to be not only an existential condition but also a professional asset.

If we look at the long history of labour, individuals' experience of work has not been characterised by stability, linearity and incremental skill development. Modern notions of continuity, regulation and predictability represent a short-lived historical exception, and in most developing economies today, the accumulation of jobs, periods of low activity, and uncertainty in markets and ecosystems remain the norm. What is novel in the current analysis of work and employment, however, is the highly individualistic approach to envisaging future solutions. The alternative to the loss of jobs in certain sectors, be they low-end services, manufacturing or information-processing roles, is the development of new individual skills in relational, creative or scientific professions. In a continuation of the shift first brought about by the industrial revolution, increasing individual skills through education and training is touted as the key to keeping ahead of the logic of replacement by automation.

By this view, uncertainty is countered by embracing the cognitive skills that enhance a person's ability to navigate and master unpredictable, complex situations. Continuous learning, mobility, flexibility and the ability to handle and interpret large amounts of data are all skills that we expect workers to maintain in order to keep the threat of irrelevance at bay.

Collective solutions to labour market precariousness

I would like to challenge the assumption that this is an objective that can be achieved individually. In the past, social organisations – families, companies, tribes, towns or guilds – were structured in such a way as to handle individual contingencies and, at the same time, to build up networks of expertise. If we look at how 'cognitive resources' are distributed among the people in an organisation, we cannot fail to observe that single individuals are rarely able to generate innovative solutions that truly push the boundaries of understanding or creativity. Not only do organisations have networks of people with different skills, they also have processes that are defined over time – tools, data-sets, procedures and roles often decades in the making – and which embed and stabilise knowledge that can then be individually mobilised. Individual intelligence and adaptability have always relied on collective and diachronic collaboration.

It is in this 'collective intelligence' that the answer to the question of flexibility and instability lies. No one will be able to handle their existential instability or professional uncertainty alone. The growing complexity of the issues that will have to be addressed professionally – whether in the public service, financial or logistic domains – can only be addressed through innovative forms of collective intelligence. The role of networked society and networked publics has been amply discussed,[1] but I question the notions that such networks emerge spontaneously and that individuals can by default rely on personal social networks and communities.

Over the last 30 years, in most workplaces, there has been a transition from task-based work to project work. At any level, most jobs now involve a higher degree of autonomy, requiring greater control over time, resources (often informational) and means, stronger coordination, and continuous monitoring of progress and outcomes. This project-centred approach to work has been reflected in the social relations that are constructed on the job. People come together around projects and drift apart after their completion. Project teams coalesce, collaborate and eventually splinter. The project as focal point or 'coordinating element' can be detected in the composition of individuals' social networks. Personal networks are often represented as a set of clusters that have coalesced around a place (university), an activity (football), a company, a family. People's professional networks are organised around projects worked on together.[2]

1 See for example Castells and Cardos 2006, Kelty 2008, Noveck 2008, Varneli 2008.

2 For more on personal networks, see Broadbent 2011, Rainie and Wellman 2012, Vendramin 2012.

The transition from lifelong linear employment to project-by-project working is also redefining identities and personal professional trajectories, and making self-employment and freelancing more desirable and acceptable. It is also challenging the traditional discourse around the role of social capital in professional networks. The oft-cited solution to job instability is to leverage social capital to support the search for a job, capital or contracts. Unfortunately, as much as personal connections are important for finding a job, the scale of personal networks will simply be insufficient to address the complexities and uncertainties we can expect in the labour market of the future.

Instead, the new era of professional development will demand a change of scale in the size and diversity of the networks that individuals belong to and thus are able to leverage. Innovation will, as always, emerge in interaction with tools and systems, but the complexity of these will require large networks of people in order to be used and understood effectively. If we accept that instability, uncertainty and complexity are not only going to be the very stuff of our future professional lives but also that they are going to be addressed *collectively*, and thus that all work will be networked and distributed in previously unforeseen ways, then we need to think about how these networks will come together.

The search for new forms of networked communities, be they for social action, political activity, sharing expertise or cocreation, is an attempt to anticipate the mechanisms that will allow large, extremely distributed, diverse groups of people to join in collective efforts of problem-solving, adaptation and decision-making. Interestingly, the extensive experience most people in the world have had over the past decade or so with social networking services such as Facebook, Twitter, Weibo or QQ, has laid the ground for new forms of networked collaboration that will be far more complex than those we have seen until now. Increasingly, people will be capable of collaborating with diverse, distant and occasional contacts on sparse, incomplete and messy information.

Indeed, the real challenge lies in the governance models of these organisations. Traditional forms of control are leading to a division of labour whereby most people produce data and a few people, aided by sophisticated systems, exploit it. This approach is not only unfair but also dramatically underuses the extraordinary human potential for understanding and handling uncertainty and generating innovative solutions. Instead, many people in interaction with sophisticated systems will be able to engender far greater knowledge.

References

Broadbent S (2011) *L'intimite au travail*, Paris : FYP

Castells M and Cardoso G (2006) The Network Society*: From Knowledge to Policy*, Center for Transatlantic Relations, Johns Hopkins University

Kelty C (2008) *Two bits: The cultural significance of free software*, Duke University Press

Noveck BS (2008) *Wiki Government: How technology can make government better, democracy stronger, and citizens more powerful*, Brookings Institution Press

Office for National Statistics [ONS] (2014) *UK Labour Market, November 2014*, statistical bulletin. http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/november-2014/statistical-bulletin.html

Rainie L and Wellman B (2012) *Networked: The new social operating system*, MIT Press

Varnelis K (2008) *Networked Publics*, MIT Press

Vendramin P (2012) 'Generations, Work and Social Cohesion', in Fashouin T, Tiraboschi M, Sanchez-Castaneda A, Serrani L and Sperotti F, *Youth Unemployment and Joblessness*, Cambridge Scholars Publishing

3.4
EQUALITY OF OPPORTUNITY: RESPONDING TO POLARISATION IN EUROPE'S LABOUR MARKET

SARA DE LA RICA
University of the Basque Country and Fundación de Estudios de Economía Aplicada (FEDEA)

Advances in information and communications technologies are shaping firms' demand for labour across the whole of Europe while simultaneously easing the globalisation of production, as firms are increasingly able to source and monitor most production processes from any location in the world. These two phenomena, computerisation and globalisation, together create important challenges for the future of work.

Computers exhibit a clear comparative advantage over human workers in carrying out so-called 'routine tasks', activities that require codifiable and explicit procedures. In doing these tasks, computers exceed humans in speed, accuracy and the quality of outcomes, and so for jobs that primarily require these characteristics, computers are likely to substitute increasingly for human labour as the relative costs of technology decline. Given the rapid pace of automation and increasing globalisation, some have argued that human labour is severely threatened as a result. However, humans have a comparative advantage over computers when it comes to 'cognitive tasks', which require thinking, improvising creative solutions and solving unexpected problems. We are also better than machines at activities which require flexibility to adapt and interpersonal interactions – 'interactive' or 'manual' tasks. Furthermore, human cognitive and interactive abilities can be complementary to the work of computers, rather than necessarily substituting for it, and hence computerisation is likely to increase the demand for people with these skills.

The polarisation of the European workforce

The interaction between computers and human work is behind much of the employment polarisation that has been observed in the European labour market in recent years. There has been a decline in jobs in occupations that lie in the middle of the skill distribution, which require the ability to carry out routine tasks (such as manual work and clerical and administrative jobs). Emerging jobs have tended to be either in the low tail of the skill distribution – those related to interactive abilities – or in the higher tail of the skill distribution, related to cognitive abilities. In the first group are jobs providing personal services, which require interpersonal relations, and manual activities, which require adaptability, including groups such as hairdressers, domestic service and drivers. In the second group are those jobs requiring reasoning, creativity, and more general problem-solving skills. Empirical evidence for the existence of this polarisation process has been found in the US by Autor and Dorn (2013) and more recently in Europe by Goos, Manning and Salomons (2014).

This polarisation raises many important concerns. The first is whether increasing computerisation and globalisation entails a decrease in the total number of jobs available. To answer this, we must consider short-term and long-term effects separately. In the short run, a net decline in jobs would be observed if the substitution effect of human work by computers is greater than the complementary effect. The risk that this is the case appears to be high, although it is likely to vary across different countries. In the long run, the outlook is perhaps more favourable. As complementarities between computer work and human work continue to develop, new jobs will emerge which might compensate for any observed short-term decline in the number of routine jobs. But there is no consensus on which of the two effects will prevail, given that there is enormous uncertainty with respect to how many new jobs these complementarities will create.

A second concern relates to the type of workers who are more and less affected by the changing nature of jobs. Evidence for the US and for Spain (see Autor and Dorn 2009 and Anghel et al 2014 respectively) suggests that older workers are among the worst losers, because they tend to be stuck in routine and hence declining jobs and lack the skills to reallocate into the emerging jobs that require either interactive or cognitive abilities. On the contrary, young workers are seen to be the winners because they are more easily able to relocate themselves within the market by redirecting their education and sharpening their focus on more cognitive abilities.

A third concern raised by polarisation relates to the potential for an increase in labour market inequality. Jobs in the high tail of the skill distribution require higher-level education,[1] and evidence indicates

1 Although higher education enables workers to develop cognitive skills, David Autor (2014) argues that it is necessary but not sufficient to develop these skills.

that wage returns to these skills have increased substantially in recent years. Indeed, Hanushek et al (2013) found that the average returns to cognitive skills[2] for 22 developed countries in the period 2011 to 2013 was 18 per cent, varying from a low of 13 per cent in Sweden to a high of 28 per cent in the US. This wage premium is a result of the high-skilled workers' higher productivity and also their scarcity. Because workers with cognitive abilities are in high demand in the labour market and in relatively short supply, firms compete to retain them and hence their wages continue to increase. The other end of the emerging jobs spectrum is characterised by low-qualified workers who offer interactive or manual non-routine abilities. The supply of people for these jobs is abundant. As a result, their wages tend to be low and not to increase rapidly or reliably. Polarisation is thus a phenomenon that tends to increase wage inequality across the population.

But I would go a step further and argue that not only are wages becoming increasingly unequal, but so are other work conditions. Competition to survive in the market for interactive or manual skills is fierce, and workers end up having to accept not only poor wages but also greater job instability. As such, polarisation is giving rise to a dual labour market, with highly productive and scarce workers offering cognitive abilities on the one side, and less productive and abundant workers offering interactive and manual (non-routine) abilities on the other.

A new world of education, for young and old alike

In the short run it is very difficult to counter this tendency towards polarisation and inequality. But more can be done in the long run if societies are prepared to commit themselves to excellence in education, from preschool through to further and higher education. Crucially, this commitment must extend to all citizens, including broader access to high-quality post-secondary education, so that a larger section of the adult population can pick up new cognitive skills. If equality of opportunities is achieved, many more workers will be able to acquire the abilities required to position themselves at the higher rather than lower end of the skill distribution. Society may thus be less unequal – or, to be more precise, less unfairly unequal.

There is one other challenge that most European societies face and which has to be taken into account in this setting: the ageing of our populations. As we live longer and mortality and fertility rates decrease, our demographic pattern is looking more like a rectangle and less like a pyramid. The population aged 65 and older in the more developed regions tripled between 1950 and 2013, from 94 million to 287 million, and it is forecast to increase further in coming decades, reaching 417 million in 2050 (European Commission 2014).

2 That is, the increase in wages for an increase in these skills equivalent to one standard deviation.

Importantly, this will affect the balance of the supply of labour, with younger workers becoming relatively scarcer in the decades ahead. Given that younger workers are the ones who are acquiring cognitive and computer complementary abilities today, their scarcity may pose a difficult supply problem as the nature of skill demand changes. At the same time, given that older workers are increasingly stuck in lower-skilled, low-paying occupations, the fact that their numbers will increase disproportionately in coming years suggests social inequality could increase further, with fewer young workers in the high tail of the skill distribution and many older workers in its low tail.

To avoid such an outcome, societies must recognise that the challenge of excellence in education is not just for young people but also for those already in the workforce who want to retrain and improve their skills. Greater equality of opportunities in this respect should be available to all, not just to the young. Europe's workforce needs a skills upgrade across all age-groups.

References

Anghel B, De la Rica S and Lacuesta A (2014) 'The Impact of the Great Recession on Employment Polarization in Spain', *Journal of the Spanish Economic Association (SERIES)*, 5(2-3): 143–171

Autor D (2014) 'Skills, education and the rise of earnings inequality among the "other 99 per cent"', *Science*, 344(843)

Autor D and Dorn D (2009) 'This Job is "Getting Old": Measuring Changes in Job Opportunities using Occupational Age Structure', *American Economic Review: Papers & Proceedings* 99(2) 45–51

Autor D and Dorn D (2013) 'The Growth of Low Skill Service Jobs and the Polarization of the US Labor Market', *American Economic Review*, 103(5): 1553–1597

Autor D, Levy F and Murname R (2003) 'The Skill Content of Recent Technological Change: An Empirical Exploration', *Quarterly Journal of Economics*, 118(4): 1279–1333

European Commission (2014) 'The 2015 Ageing Report: Underlying Assumptions and Projections Methodologies', *European Economy*, 8

Goos M, Manning A and Salomons A (2014) 'Explaining Job Polarization: Routine-Biased Technological Change and Offshoring', *American Economic Review*, 194(8): 2509–2526

Hanushek E, Schwerdt G, Wiederhold S and Woessman L (2013) 'Returns to Skills Around the World: Evidence from PIACC', NBER working paper 19762. http://www.nber.org/papers/w19762

3.5
THE DIGITAL REVOLUTION: HOW SHOULD GOVERNMENTS RESPOND?

HENNING MEYER
London School of Economics

After more than half a decade of debate dominated by the global financial crisis, 2014 saw a departure from this singular focus. Thomas Piketty (2014) started a global discussion about historical patterns of inequality and their negative repercussions. And looking to the future rather than back in time, *The Second Machine Age* by Erik Brynjolfsson and Andrew McAfee of the Massachusetts Institute of Technology (2014) showed how the digital revolution is about to transform our economic and social lives. The key problem for policymaking is that these technology-driven developments are certain to further increase existing inequalities and to create new ones at a time when, as Piketty has shown, we have already returned to historically high levels.

The digital revolution and jobs

Labour markets in particular look exposed to the forces of progress because many 'middle-class' jobs will be vulnerable as a result of technological change, either through automation or as a result of more polarised global competition. A significant proportion of tasks embedded in white-collar jobs can and will be automated in the years ahead. Whether you think about secretarial work, text analysis or even more complex work such as the processing of new research (which IBM's Watson supercomputer already does), there are significant changes on the horizon. Studying the structure of work in the US, Carl Benedikt Frey and Michael Osborne (2013) came to the conclusion that as much as 47 per cent of total US employment is at risk, while the equivalent figures for European countries, calculated by the Brussels-based thinktank Bruegel, range from about 47 per cent in Sweden and the UK to 62 per cent in Romania (Bowles 2014).

The Pew Research Centre canvassed almost 2,000 experts about their expectations for the coming decade. Although predictions about the end state vary, there seems to be little disagreement about path we are on:

> *'Half of these experts (48%) envision a future in which robots and digital agents have displaced significant numbers of both blue- and white-collar workers – with many expressing concern that this will lead to vast increases in income inequality, masses of people who are effectively unemployable, and breakdowns in the social order. The other half of the experts who responded to this survey (52%) expects that technology will not displace more jobs than it creates by 2025. To be sure, this group anticipates that many jobs currently performed by humans will be substantially taken over by robots or digital agents by 2025. But they have faith that human ingenuity will create new jobs, industries, and ways to make a living, just as it has been doing since the dawn of the Industrial Revolution.'*
>
> Pew 2014: 5

The variation in responses is not down to disagreements about the short-term effects of the digital revolution. Instead, it is rooted in the question of whether economies can repeat historical patterns and create more jobs in the end than are destroyed by technological change along the way. Either way, there remains a significant role for public policy to shape the process so that the sombre 'social breakdown' scenario does not come to pass – and, even if the positive scenario becomes reality, to manage the risk of huge amounts of transitional unemployment.

There are big political problems on the horizon. When large parts of the middle classes are threatened with unemployment through no fault of their own, the political pressure will rise. At a time when the political process is more and more focussed on the short term, it is a dangerous omission if long-term policy thinking is neglected. Here I would like to make three suggestions as to what a framework for this kind of (badly needed) new thinking might look like.

A framework for policy responses

First, when jobs are replaced, job descriptions change beyond recognition and completely new types of work might arise a proactive educational policy is essential. This is common sense, and should lead to an immediate rethinking of what today passes as suitable educational policy. Much of today's standard education still relies heavily on committing facts to memory rather than on building analytical and creative capabilities. This was understandable in days gone by when access to information was not necessarily a given, but

today information is always available. Instead, it has become much more important to know what to do with it. Analytical and creative capabilities will be the core ingredients of successful careers in the future, as they are transferable and can be applied to new contexts. At the very least, the digital revolution will demand that workers are more flexible and adaptable, and our educational systems need to reflect this much more than they do currently.

The second suggestion concerns the distribution of work. In a sense we are back in 1930 when John Maynard Keynes wrote about *The Economic Possibilities for our Grandchildren*. In his seminal essay, he predicted that economic progress would mean that, for the first time, future generations would be freed from taking care of pressing economic needs. He was certainly right about the degree of economic development but wrong about the 15-hour working week that he predicted. Keynes believed that with most economic needs fulfilled, people would opt for more leisure time rather than the diminishing returns of increasing income.

One policy goal should therefore be creating the economic preconditions for and incentivising the reallocation of work. The cofounder of Google, Larry Page, seemed to think along the same lines when he suggested that we should all work less or divide jobs between more people (Selby 2014). In this, Page joins the likes of Virgin founder Sir Richard Branson, who has long argued that more flexible working hours would allow for a better allocation of work. Our lives are becoming more complex and the division between work and leisure is becoming increasingly hard to draw. Creating a framework in which work is distributed more efficiently would therefore be very welcome.

My third suggestion concerns people who cannot benefit from better education or a reallocation of work and still find themselves unemployed. In *The Second Machine* Age, Brynjolfsson and McAfee warn about defective aggregate demand in the economy as a result of high unemployment, but they stop short of making a direct policy recommendation. Instead, they suggest that the idea of a basic income should be revisited while acknowledging the fact that work also has important social purposes beyond simply earning a living.

Without going more deeply into the debate about the basic income, there are at least two major drawbacks to this solution. The first is the one acknowledged by Brynjolfsson and McAfee: work does not just generate income but is also a source of fulfillment and self-esteem and an important part of our daily social interactions. This important function cannot be replaced in a change to ‘handing out money’ so that people can remain functional consumers. The second aspect is that, by its usual definition, a basic income is paid to everybody, including the ‘winners’ of the brave new digital world, and therefore represents an inefficient use of scarce public resources.

A much more focused way of addressing unemployment would be to take the basic idea of the European Union's youth guarantee and apply its principles to the general labour market. The youth guarantee makes a concrete offer of a job, apprenticeship or traineeship to unemployed young people across the EU, and thus seeks to eradicate stubbornly high youth unemployment. There is no apparent reason why this principle and the various implementation lessons currently being learned across Europe – good and bad – cannot be transferred to the wider labour market.

A public job guarantee could be introduced, paying at least a salary at the basic income level, so that everyone looking for a job could find one. This would concentrate public resources on the people most in need, preserve the social functions of work, and guarantee that people are protected not just from economic poverty but also from socially poorer lives. There would be another public policy benefit as well: given that governments would guarantee employment, they could set incentives in such a way that hitherto underserved areas receive the labour injection they require. Against the backdrop of ageing societies, the whole area of old-age and health care, for example, is likely to require more workers in the future, and a public job guarantee could make sure that the supply of workers keeps up with rising demand. Finally, there is the added consideration that care and other personal services, as well as work depending on social capital, are areas that are less likely to be significantly affected by the digital revolution, and so represent an opportunity for sustainable employment and jobs growth.

The challenge for governments

We are only at the beginning of the 'second machine age' – the first being the period in the early 20th century when mass production developed, allowing a range of consumer and capital goods to be produced more cheaply – and the full implications of the digital revolution are yet to become clear. It is, however, important to look at the changes likely to happen from the situation we are currently in. The prospect of new and quickly widening inequalities is particularly worrying when viewed from our current starting position, with the highest levels of inequality in living memory. Nobody can accurately predict how things will play out, but if only a small part of the well-founded predictions become reality then we are facing the prospect of major political and social upheavals.

It is therefore imperative to think about sustainable policy solutions now, in order to be prepared to minimise the adverse effects and take full advantage of the extraordinary opportunities of the digital revolution. None of this is set in stone and the political debate has only just begun. But it is important to start somewhere and over time to bring these issues into mainstream policy discourse. For

now, however, what all too often passes as a governmental 'digital agenda' seems woefully inadequate in light of the major challenges that lie ahead.

References

Bowles J (2014) 'The computerisation of European jobs – who will win and who will lose from the impact of new technology onto old areas of employment?' Bruegel blog, 17 July 2014. http://www.bruegel.org/nc/blog/detail/article/1394-the-computerisation-of-european-jobs/

Brynjolfsson E and McAfee A (2014) *The second machine age: work progress and prosperity in a time of brilliant technology*, WW Norton & Co

Frey CB and Osborne M (2013) 'The future of employment: how susceptible are jobs to computerisation?', Oxford Martin School. http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

Keynes JM (1930) 'The Economic Possibilities for our Grandchildren', reprinted Keynes JM (1963) *Essays in Persuasion*, WW Norton & Co. http://www.econ.yale.edu/smith/econ116a/keynes1.pdf

Pew Research Center [Pew] (2014) *AI, Robotics, and the Future Of Jobs*. http://www.pewinternet.org/files/2014/08/Future-of-AI-Robotics-and-Jobs.pdf.

Piketty T (2014) *Capital in the Twenty-First Century*, Harvard University Press

Selby J (2014) 'Larry Page: Billionaire Google co-founder says "People shouldn't work as much"', *Independent*, 8 July 2014. http://www.independent.co.uk/news/people/larry-page-billionaire-google-cofounders-says-people-shouldnt-work-as-much-9591534.html

3.6
WELCOMING OUR ROBOT OVERLORDS: THE DISRUPTIVE POTENTIAL OF TECHNOLOGICAL PROGRESS

DIANE COYLE
University of Manchester

People have worried about the effects of technological change on economic and social life since the dawn of capitalism – probably since the dawn of human society. Yet technological change is without question the driving force in improving living standards. This is not to say that 'techno-worries' are misplaced. Even at its most benign, technology is disruptive: whole categories of work become redundant; there are winners and losers; fortunes are made and lost; politics and power structures change; and deep, long-lasting social changes are set in motion.

Previous examples of general purpose technologies that have had these wide and deep effects include printing, steam power and electricity. Each time, people have been forcefully struck by the speed of change and the disruption it causes. But the vital characteristic thing about today's digital technologies is the unprecedented speed of their advance, and the corresponding rapid fall in their cost. The economic forces this unleashes cannot fail to be extraordinarily large. So it is no wonder that worries about 'our robot overlords' have emerged.

Natural constraints on progress

Every advance in technology has cost some jobs. We no longer have people who walk around the streets waking up the workers – affordable alarm clocks made them redundant. Not many are employed now in the horse-drawn carriage industry, or making whalebone corsets. But new jobs took their place, on assembly lines and in offices. These jobs required an increase in literacy and numeracy in the workforce as a whole, which was delivered by the expansion of free universal education. And now we have new categories of jobs, including data scientists and viral marketers –

many of which are probably beyond the comprehension of most of us. Technological progress has been disruptive but always – eventually – good for economic growth.

If 'this time is different', it will be because of the speed and scale of advances in the digital technologies. Moore's law states that processing speeds have been increasing at about 40 per cent a year for 50 years, far faster than the speed of progress in any earlier technology. One recent article predicted that by 2025 there will be robots or smart machines with an IQ higher than 90 per cent of Americans (Davidow and Malone 2014). This is not just a rich economy issue, either: low-wage countries are also affected by automation. Foxconn, which employs a million people in China, recently said it plans to install 30,000 robots a year, with a target workforce of 1 million such 'Foxbots'.[1]

How worried should we be by the speed of change? Not as worried as the most alarmist predictions suggest, I believe. Foxconn currently has just 10,000 Foxbots installed, and has meanwhile taken on an additional 100,000 human workers. The potential for automation is real; but if it does happen, it will not necessarily be at the expense of workers. Jobs will only be automated out of existence if businesses actually invest in the computerised equipment. History provides many examples of new technologies spreading very slowly because the old technologies remain profitable, or because additional secondary investment is needed, or because there are other barriers to achieving the necessary level of investment.

Retooling or 'digitising' a production process or service is not simple. NHS productivity would leap forward if records could be fully digitised but, despite making a huge investment in the attempt, the NHS still employs more than 750,000 people in secretarial work (although this figure is predicted to decline to 580,000 by 2025[2]). Besides, computerising the records so far has been a mixed blessing: the old physical system was reliable; new systems in hospitals often frustrate their users with crashes and passwords that don't work.

New general purpose technologies also require significant secondary investment before they can have their full transformative effects. Paul David (1990), looking at the spread of electricity in the 1920s and '30s, showed it required the building of grids and networks, secondary innovations in devices to use electricity, rebuilding factories to make the most efficient use of electricity rather than steam, and so on. In fact, the peak effects of an innovation dating back to the 1880s were felt between 1930 and 1950.

1 For more on 'Foxbots', see Xinhua Net 2011, Bora 2014.

2 See: https://nationalcareersservice.direct.gov.uk/advice/planning/jobprofiles/Pages/MedicalSecretary.aspx

There are still a lot of things the new digital technologies cannot do. It is easy to be carried away in the excitement of self-driving cars or medical diagnosis by software. However, these need massive investment before they become commonplace. Foxconn found that their first-generation Foxbots lacked the dexterity needed to do even simple routine tasks and could not judge quality on the production line. Just as cars required the road network to be built, Google cars require not only Google maps and GPS but also a large network of sensors to be installed, and still hand over control to a human driver if something unexpected happens.

The effects of progress on inequality

As technological progress accounts for the vast majority of long-term economic growth, we should welcome automation. Investment in new capital will enhance labour productivity and ultimately improve living standards. As citizens of ageing countries with slow population growth and a lacklustre productivity record, Europeans should be embracing the robots: we will need them to pay our pensions and perhaps even to care for us.

This is not to downplay at all the disruptive effects on jobs in the meantime. Automation might be good in the long term, but in the short term there will be winners and losers. David Autor (2014) has drawn attention to the specific tasks that can and can't be performed by robots or computers. He calls it Polanyi's paradox (after Michael, not Karl): 'We can know more than we can tell'. That is, he argues, many tasks rely on humans' tacit knowledge, whereas digital machines can only substitute for (literally) codifiable knowledge. Failing to distinguish between these types of activity makes for a tendency to overstate the extent to which computers will ever be able to substitute for human workers.

Most business processes consist of a number of tasks, to be performed by a mix of machines with different functions and humans with different kinds of skill. If the machines become much more productive then they will substitute for both machines and humans. But they will also raise the productivity and economic value of humans who can perform complementary tasks.

People in professional jobs tend to have high cognitive skills that complement the routine tasks computers can do. There has been a growth in demand for their services without (yet) a corresponding increase in the supply of people with high skills, and they have seen growth in employment and real earnings. At the low-income end of the labour market, people tend to have only partly complementary skills – in other words, working with a computer makes some of them somewhat more productive (more so for a truck driver using GPS and a logistics system than for a cleaner). Although demand for these

workers has been growing, so too has supply. Their real wages have been at best growing slowly and in some countries have declined.

This polarisation of employment growth – with gains in high skill and low skill jobs – has led to increased polarisation of incomes too. Inequality has several causes but technology is one of the most important. Indeed, the economic historian Robert Allen (2007) has argued that an increase in inequality is an intrinsic part of technology-driven growth. In the initial phase, capital investment needs to earn a high rate of return to encourage more saving and investment. When that has occurred, raising labour productivity, real wages increase in the second phase. These phases are long – he dates them from around 1760–1850 and then the 1850s to the early 20th century.

There is nothing inevitable about a repetition of 19th-century inequality. The markets of modern societies are nothing like the markets of a century ago; they sit in a wholly different social and institutional context. However, it is worrying that, since about 1980, income inequality has increased in most European countries as well as the US. The rise in inequality has been driven largely by big increases in the highest incomes – the higher returns to those very skilled people, as well as to lucky people in sectors like banking where the institutional structures and deregulation have permitted extremely high earnings. Meanwhile, the dilution of union power and downward pressure on public spending have inhibited wage growth and led to worse working conditions for many people in low-paid jobs.

The next phases of technological progress will require an institutional and political response to the risk of yawning inequality. We must do better today than was achieved during previous episodes of significant technological advance. Indeed, those experiences teach us that structural change in the economy is not a peaceful process. The economic dislocations and extreme inequality of the 1920s led to economic, political and human disaster in the 1930s and 1940s. Even in the 1980s and 1990s, in a less cataclysmic period, deindustrialisation resulted in the creation of a group of long-term unemployed households whose complex poverty has now been handed down the generations.

Fair progress: policy responses to the challenges of technological change

An obvious requirement is for more and better education. This may sound banal, but little has been accomplished despite the fact that the policy world has been talking about the need to improve education for more than a decade. Most European countries have systems that deliver an elite with high cognitive skills. The need now

is to focus education and training on non-routine (cognitive and non-cognitive) skills that will ensure people are able to complement rather than be substituted by new machines in the workplace. Policymakers need to take seriously the accumulated evidence that interventions before the age of 10, and even before the age of three, make substantial differences to life outcomes, and to put serious money and effort into early interventions for the lowest income families. At a time of budget cuts, this will mean reduced subsidies to higher education and increased subsidies to primary education and nurseries.[3]

The other obvious policy challenge lies in inequality, of incomes and wealth. Extreme inequality might matter for economic growth – the evidence is a bit mixed, although IMF economists believe this to be the case (Ostry et al 2014) – and it certainly matters for politics. The rise of populism and new parties at the extremities of the political spectrum is the result of many people believing the economy is not working for them, while it is giving others very high rewards indeed. And it is hard not to agree with them: it is not the robots drinking champagne in Davos, but 'the 1 per cent'. Distribution of income is a political issue as well as an economic one.

The long-term social effects of new technologies are vast, and impossible to forecast. Printing enabled the Renaissance, which made possible the Protestant Reformation and the scientific Enlightenment. Railways enabled urbanisation, because sufficient food could be transported from the countryside to urban markets; and then suburbanisation, enabling further economic growth. Nobody in 1850 would have predicted that half the world's population would live in cities by 2015. It is impossible to say what kind of world we are shaping with digital technologies, but to be sure what the world is like a few decades from now is up to us.

References

Allen R (2007) 'Engel's Pause: A Pessimist's Guide To The British Industrial Revolution', discussion paper 315, Department of Economics, University of Oxford. http://www.economics.ox.ac.uk/Department-of-Economics-Discussion-Paper-Series/engel-s-pause-a-pessimist-s-guide-to-the-british-industrial-revolution

Autor D (2014) 'Polanyi's Paradox and the Shape of Employment Growth', presentation, Economic Policy Symposium, Jackson Hole, 21–23 August 2014. http://www.kc.frb.org/publicat/sympos/2014/2014.0818.autor.handout.pdf

Bora K (2014) 'Apple iPhone 6 Could Be Assembled By 'Foxbot' Robots Deployed By Foxconn', *International Business Times*, 7 July 2014. http://www.ibtimes.com/apple-iphone-6-could-be-assembled-foxbot-robots-deployed-foxconn-1620412

3 For more on the power of early interventions, see for example Melhuish 2004.

David P (1990) ‘The Dynamo and the Computer: An Historical Perspective on the Modern Productivity Paradox’, *American Economic Review*, 80(2): 355–361

Davidow W and Malone M (2014) ‘What Happens to Society When Robots Replace Workers?’, *Harvard Business Review*, 10 December 2014. https://hbr.org/2014/12/what-happens-to-society-when-robots-replace-workers

Melhuish E (2004*) A literature review of the impact of early years provision on young children, with emphasis given to children from disadvantaged backgrounds*, National Audit Office. http://www.nao.org.uk/wp-content/uploads/2004/02/268_literaturereview.pdf

Ostry J, Berg A and Tsangarides C (2014) ‘Redistribution, Inequality and Growth’, discussion paper SDN/14/02, IMF. http://www.imf.org/external/pubs/ft/sdn/2014/sdn1402.pdf

Xinhua Net (2011) ‘Foxconn to replace workers with 1 million robots in 3 years’, 30 July 2011. http://news.xinhuanet.com/english2010/china/2011-07/30/c_131018764.htm

3.7
AUTOMATION AND EQUALITY: THE CHALLENGE TO PROGRESSIVE POLITICS

ALAN MANNING
London School of Economics and Political Science

Most European labour markets are currently a mess, afflicted by stubbornly high unemployment or stagnant (even falling) average real wages – or both. There are two main views about the cause of this mess. First, that it is simply the result of the economic turmoil unleashed by the 2008 financial crisis and not yet resolved, especially in the eurozone. Second, that it is the consequence of deeper-seated structural changes in labour markets that have severed the link between economic growth, employment and living standards.

Put more melodramatically, the fear is that robots are after many people's jobs, and one does not have to spend much time online or open many newspapers to see these fears writ large. In June, the BBC asked: 'Will workplace robots cost more jobs than they create?' In November, the *Independent* ran the headline: 'A third of UK jobs to be replaced by robots and computers in next 20 years'.[1] These stories vary from short-term threats to jobs and wages, to longer-term musings on what will happen when robots are smarter than people.

I tend to the view that the short-term crisis is more important than the longer-term trends, and that our biggest problem at the moment when it comes to raising living standards for workers is a low level of investment not a high level. This essay outlines why we should not unduly fear the impact of new technology on the labour market. It is not, however, a call for complacency: new technology, including but not confined to robots, will have sizeable impacts on our societies, and active policy responses are needed to ensure the benefits are shared fairly.

1 See Crossley 2014, Vincent 2014

Popular views of automation

A Nobel prize-winning economist has summarised these threats:

> *'The proportion of the working population required to man the extremely profitable automated industries would be small; wage rates would thus be depressed; there would have to be a large expansion of the production of the labour-intensive goods and services which were in high demand by the few multi-multi-multi-millionaires.'*

The economist was James Meade and he died in 1995 – he wrote those words in 1964. He was not alone in fretting about the impact automation was going to have in the 1950s and 1960s: Kurt Vonnegut's first novel, *Player Piano*, published in 1952, was about the dystopian impact automation would have. And we can trace this type of fear back through Karl Marx's hypothesis of the immiserisation of the proletariat to the earliest stages of the industrial revolution and the original Luddites, the handloom weavers who saw their livelihood being destroyed by the power loom.

Historically, these fears came to nothing. Since the start of the industrial revolution there is a clear upward trend in real wages, and there is no clear trend in unemployment. Real wages have risen because productivity has risen, and productivity has risen because of technical changes, which have largely been the result of increased mechanisation and automation in production. It is clear that the average worker has benefitted from new technology, rather than being harmed by it. To be sure, there are often losers from innovation, especially in the short term. But over long periods of time, everyone has gained from it – there is currently virtually no one in Europe who is as badly off as the average person was two hundred years ago.

So why are popular views about the impact of technology so much at variance with the evidence? I think the reason is that the losers are often very visible, and the losses heavily concentrated on small groups, whereas the gains are spread more widely and are less conspicuous. Take the example of the handloom weavers, for whom the invention of the power loom was undoubtedly a disaster. The power loom was introduced because it was a cheaper way to produce cloth, and over time it led to a reduction in the price of clothing. This was good for the general population, who now had more money left over after buying their clothes, which they spent on a whole variety of goods and services. As they did so, they increased the demand for the workers who produced those other goods and services. If they treated themselves to some fish and chips, there were now more fish-fryers in the economy as a result of the invention of the power loom. It sounds ridiculous to say but it is true, and to ignore these effects is to ignore the largest impact of technological change.

Who owns the robots?

Previous waves of technological change have ultimately been good for all workers, in spite of the many commentators who believed the opposite. But the nature of new technology is that there is no guarantee that the future will be like the past. So who are the winners and losers from the latest wave of innovation?

In recent years the most important labour market trend has been job polarisation or hollowing-out. This change seems to be occurring in all European economies and – to date – shows no sign of stopping. What is unusual about the current situation is that these 'losers' in the middle of the distribution make up a politically critical group. This is perhaps the simplest explanation as to why the average voter in Europe is so dissatisfied with the way their economy and government are performing. The biggest winners, by contrast, are a tiny group of those at the very top of the earnings distribution, the so-called '1 per cent'.

This outcome suggests that we need policies to make sure that automation leads to benefits that are widely shared, as there is no guarantee this will happen automatically. Making sure that growth is inclusive means bearing down on inequality, and this is where we need progressive policies.

What might these policies look like? We need to do more to remedy inequalities in our education systems to ensure that they offer fair opportunities for all and that parental wealth and privilege cannot buy advantage. And we need to make sure that people have the skills to take advantage of change. We will also probably need at some point to take on vested interests, for example in the professions and related services that have done so well in recent years. Technology may well undermine the mystique of expertise that surrounds so many workers in the professions, whether medical, legal, educational or financial. But, even as their privileged positions are threatened by computerisation, these groups are bound to put up a fight to protect their gains, and the professions are probably the best-organised workers in today's labour market. We will need to regulate financial markets to make sure that the earnings of those in that sector really do reflect its benefits to wider society.

Lastly, I think we will need to do more redistributive taxation, to tax the highest incomes more heavily. So large has been the increase in the share of income going to the top 1 per cent that taxing them more heavily would only return them to the level of earnings they had a few short years ago – it is simply not credible that slightly higher taxes will drastically reduce work effort among high-earners. But we will need to deal with tax avoidance and evasion, which is the more serious problem when it comes to raising taxes on the richest.

Crucially, however, if the increasing importance of robots means that the share of all income earned by capital rises, then we will need to pay more attention to the distribution of wealth. Suppose we end up in a world where machines can fill every post more cheaply than human workers, we might worry about how people will cope. If most people own no wealth, then these fears are justified. But if wealth is evenly spread, it is a bit like worrying about what British aristocrats do with their time just because every job on the estate is done by servants. The important question is 'who owns the robots?' If ownership is widely spread, then quality of life will be high for everyone.

Progressive policies to save capitalism's dreams of growth

The interaction of the market and technological progress cannot be guaranteed to deliver inclusive growth and a fair distribution of wealth. Making sure that growth in Europe is inclusive is the job of the political process, and progressive politics in particular, as it is motivated primarily by the underlying belief that the distribution of rewards should be fair. Those on the progressive side of politics should not be apologetic about their beliefs in a fair society and the policies needed to move us in that direction.

Current trends are limiting or reducing the opportunities and rewards for the labour market's 'middle class'. But if there is no benefit from growth for the median earner then they can hardly be expected to support growth-friendly policies – and the likelihood is that, eventually, they won't. Ultimately, progressive politics is needed – as is often said – to save capitalism from itself.

References

Crossley R (2014) 'Will workplace robots cost more jobs than they create?', BBC News website, 30 June 2014. http://www.bbc.co.uk/news/technology-27995372

Meade JE (1964) *Efficiency, Equality and the Ownership of Property*, Routledge

Vincent J (2014) 'A third of UK jobs to be replaced by robots and computers in next 20 years', *Independent*, 10 November 2014. http://www.independent.co.uk/life-style/gadgets-and-tech/a-third-of-uk-jobs-to-be-replaced-by-robots-and-computers-in-next-20-years-9851119.html

3.8
MANUFACTURING A LIFE OF LEISURE

DONALD STORRIE
European Foundation for the Improvement of Living and Working Conditions

There is nothing that policymakers want to know more keenly than the shape of the future. We all seem to believe that we are living in very uncertain times, and the fact that more and more policy research is being reoriented towards so-called 'foresight studies' is a clear sign of this. We may not know where we are going but there is a perception that we are going there fast.

One crucial uncertainty is this: where will the jobs of the future come from? After seven years of stagnation in Europe, facing an historically high level of global competition, and given the ever-increasing pace of labour-saving innovation, can our economies generate gainful employment for everyone who wants it? This is a big question, not only for our economies but also for the welfare of our citizens and the cohesion of our societies.

The future of manufacturing jobs in Europe

I think the future of jobs in manufacturing in Europe is of greatest interest now. Manufacturing is of exceptional importance in this first real era of globalisation. The strongest growth in demand will continue to be outside Europe, and almost 80 per cent of Europe's exports are manufactured goods. It is also a very opportune moment to think strategically about manufacturing, as there is much to suggest that we are on the cusp of another industrial revolution. While there are exciting developments in, for example, bio- and nanotechnology, most interest is being generated in the application of robotics and automation technologies in manufacturing.

These technological innovations will lead to a massive increase in manufacturing productivity. Windfall profits will accrue to those in the vanguard of this revolution. It will also benefit highly skilled workers – mainly software developers, engineers, and those who work in material science and research. Consumers will benefit from the lower

prices that follow on from lower production costs. The technologies will save massive amounts of labour – and so the question is, where will people find work? We have been in similar situations before and, it is said, predictions of 'the end of work' have continually been proved wrong. But have they really? After a long boom, unemployment in Europe hit a 10-year low in March 2008. But this 'low' stood at 6.7 per cent of the labour force, with 16 million Europeans officially unemployed (Eurostat A).

Technology has, of course, replaced manufacturing jobs before. Why, conceptually, could it be different this time? One possible difference is that the destructive effects of the new technologies are simply larger, because ICT is a truly generic technology that can spawn innovations – and replace jobs – in practically every corner of the economy. Globalisation means that the lag or 'catch-up time' for new technology to be taken up by very large and low-cost competitors is likely be very short indeed, and it is far from clear that the technological leadership of the west will continue. Moreover, previous waves of technological innovations led to workers working *alongside* a machine: now, the substitution of labour by machines is so far-reaching that in some spheres the workerless factory is becoming a reality.

While it certainly would be desirable to see a resurgence of manufacturing in Europe, is this a realistic hope? High labour costs, while not the only factor behind a firm's decision about where to locate, are the most important reason why manufacturing has shifted out of Europe. The supply chain story of one of the iconic products of the 21st century – the iPad – illustrates a vital point. When it first went on the market the iPad retailed for $500, but it cost only $8 to manufacture. In some respects this is encouraging news for European manufacturing. With wages making up an increasingly smaller proportion of the total value-added of products, they become less vital to decisions about where production is based. When the innovative link in supply chains is in the manufacturing process itself – something which is likely to be quite common with the emerging technologies – it is both highly desirable and feasible that this remains and develops in Europe, not least in order to keep R&D and other related services here as well. The bad news, however, is that firms will employ a significantly lower number of workers in the actual production process.

The need for a new industrial policy

After decades of efforts, including by the European Commission, it is hard to see how active labour market policy can do much more – at least in Europe's better-performing economies – to respond to labour market changes. Moreover, it simply cannot cope with the global competitive challenges we now face.

Industrial policy has gone through many phases. Old-style policy focused on product market interventions (production subsidies, state ownership) and then on taxes and subsidies designed to correct market failures (training subsidies, investment allowances). More modern versions have acted to build systems and networks, promote beneficial institutions, and align strategic priorities. The risks of industrial policy remain the same: bad government decisions, rent-seeking, and the risk of capture when the state and big business engage. And it is always prone to lapse into protectionism. Industrial policy is notoriously difficult, perhaps even more in its implementation than its formulation. The implementation phase itself requires significant resources, and it needs to be shepherded along by talented officials.

After decades in which it has been held in low regard, it is time for industrial policy to once again take centre stage. We must first embrace the notion that it is possible to do successful industrial policy. We must also accept that in this era of global giants it is almost inconceivable that EU member states can face up to the challenge alone. I think that there actually is a role for some of the more old-fashioned, selective policies during periods of radical technological change like we are experiencing now. Moreover, it is now that infrastructure needs to be built up and standards to be established.

Economic democracy and Keynes' 'life of leisure'

I believe that technological unemployment (Joseph Schumpeter's 'destruction') may be much more prevalent in the years to come, and that the opportunity for Schumpeterian creation, at least in terms of jobs, will be more limited. In the 1930s, John Maynard Keynes took an optimistic view of the impact of technology, believing that eventually we could all work 15 hours a week and spend the rest of our time in leisure.[1] However, the pace of working-time reduction has slowed appreciably in recent decades, while unemployment has secularly increased.

Working-time reductions and job-sharing will have to be revisited. The really thorny issue is – as it always has been – who will reap the returns on the capital of the forthcoming industrial revolution? Will the robot workers – like in the dystopian film *Blade Runner* – be owned by global mega-corporations that preside over an urban sprawl of the disenfranchised poor? Or will there be an economic democracy of genuine profit-sharing, allowing the majority of our citizens to reap the benefits of Keynes' vision of a life of leisure?

References

Eurostat (A) 'Unemployment rate by sex and age groups', dataset. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_m&lang=en

1 See Henning Meyer in this volume.

4.1
A SURVEY OF EUROPEAN EMPLOYERS: SKILLS USE, POLARISATION AND WORKFORCE CHANGES

TONY DOLPHIN
IPPR

As the previous chapters in this collection have shown, academics and researchers have a lot of interesting things to say about how the labour market in Europe is changing as a result of globalisation and, in particular, technological innovation. Many fear that the pace of change over the next decade will be so great that it will result in permanently higher levels of unemployment and a polarisation of the workforce. Arguably, these effects can already be seen in the data, with EU unemployment at 10 per cent and evidence in many countries that the proportion of jobs requiring mid-level skills is declining.

But what do firms have to say about change, and how are they responding to it? To find out, we commissioned Populus to conduct a survey of 2,500 firms across five European countries, and this chapter reports the results of this exercise. The survey covered 500 firms in each of France, Germany, Spain, Sweden and the UK, and in all five countries the sample ensured a representative mix of firms by size, by broad sector of the economy (private, nationalised industries and public corporations and the public sector) and by industry.

The rise and rise of computing skills

The survey suggests that employers require their employees to use computing skills more than mathematical skills, reading and writing several pages of text, or mechanical or other technical skills. Half of firms reported that more than 60 per cent of their employees need to use computers, compared to 35 per cent who said the same for needing to read or write more than four pages of text, 24 per cent for mathematical skills and only 21 per cent for mechanical or technical skills. Although there is likely to be a big variation in the particular use that people make of computers – from simply

sending emails, through word-processing and simple spreadsheet tasks, up to running highly complex programmes – the same is probably true of the other skill categories . It seems fair to say that we have reached a point where computing skills have become most valuable for employees in the European jobs market.

Table 4.1.1
Distribution of skill use in European firms, by proportion of employees requiring certain skills (% of firms)

	Maths skills	Reading or writing more than four pages of text	Using computers	Mechanical or technical skills
Used by fewer than 20 per cent of all workers	36	25	16	36
Used by 20–39 per cent	23	21	17	22
Used by 40–59 per cent	17	18	17	21
Used by 60–79 per cent	9	11	12	10
Used by 80+ per cent	15	25	38	11
Mean	*39*	*47*	*58*	*37*

Note: Based on Populus survey of 2,500 firms in five countries. Excludes those replying 'don't know'.

Skill use is, to a certain extent, linked to the size of a firm. Small firms – those with fewer than 50 employees – are least likely to have a high proportion of their workforce using mathematical skills and least likely to have seen this proportion increase over the last two years. Although there is a less clear pattern for reading and writing longer text and the use of computers, in both cases small firms are least likely to have seen an increase in the proportion of employees using these skills over the past two years. These differences are, however, small compared to the differences that are apparent across industries. Here there is much clearer evidence of a polarisation of skills use.

The polarisation of skills use by industry

There have been increasing concerns in recent years – on both sides of the Atlantic – about an actual or potential polarisation of the workforce, with mid-skill jobs disappearing and more high-skilled jobs, but also more low-skilled jobs, being created. From the results of our survey, we are unable to say whether firms believe such a process of polarisation is taking place. However, the survey does reveal a different type of polarisation of skills use – by

industry. And this would be consistent with the wider trend towards polarisation that so worries economists.

Broadly speaking, when firms are categorised by industry they fall into one of three groups:

1. industries in which a relatively high proportion of employees use mathematical skills, read or write at least four pages of text and use computers
2. industries that are average in this respect
3. industries in which a relatively low proportion use these skills.

In the first group are financial services, accountancy, legal services, IT and communications and real estate; in the third group are hospitality and leisure, retailing, manufacturing, and transport.

The pattern for use of mechanical and technical skills is different, being most used in manufacturing, construction and transport. Thus, hospitality and leisure and retailing are the only sectors where skills use is below average across the board.

Table 4.1.2
Percentage of employees of European firms requiring certain skills, by industrial sector (mean % across all responses)

	Maths skills	Reading or writing more than four pages of text	Using computers	Mechanical or technical skills
Manufacturing	38	39	45	45
Construction	39	43	44	41
Retail	35	38	53	32
Financial services	49	55	71	32
Hospitality and leisure	30	37	45	36
Accountancy	47	58	71	34
Legal	40	65	78	36
IT and telecoms	47	56	70	35
Media, marketing, PR and sales	33	50	72	31
Education	40	58	64	35
Transportation and distribution	36	37	49	43
Real estate	45	65	75	37
Other	37	49	60	36

Note: Based on Populus survey of 2,500 firms in five countries.

This is perhaps not surprising. The industries in the first group would conform to most people's expectations of industries that employ a high proportion of high-skilled workers, while the opposite would be true of hospitality and leisure and retailing. What is more interesting, however, is that this gap in skills use appears to be widening (see table 4.1.3). In particular, firms in the industries that have a low proportion of their workforce using skills across the four categories are also least likely to have seen an increase in the proportion using these skills.

This suggests that a sectoral polarisation of skills use is occurring. In one group of industries, a high and often increasing proportion of the workforce is required either to use mathematical, reading/writing and computing skills or to use mechanical and technical skills, while in another group the proportion using any kind of skills is low and increasing at a slow pace. Patterns of skills use might therefore be leading to increased inequality, with the risk that people working in 'low-skill' industries, even if they endeavour to acquire more skills, will have very few opportunities to make use of them.

Table 4.1.3
Firms saying that the proportion of employees using certain skills has increased in the last two years, by industrial sector (net % of firms)

	Maths skills	Reading or writing more than four pages of text	Using computers	Mechanical or technical skills
Manufacturing	29	25	41	32
Construction	23	21	32	12
Retail	10	12	35	20
Financial services	21	22	38	16
Hospitality and leisure	3	8	29	16
Accountancy	10	25	36	20
Legal	17	17	42	8
IT and telecoms	20	19	34	12
Media, marketing, PR and sales	-2	22	29	19
Education	12	19	37	8
Transportation and distribution	22	19	40	29
Real estate	3	16	28	12
Other	13	17	35	15

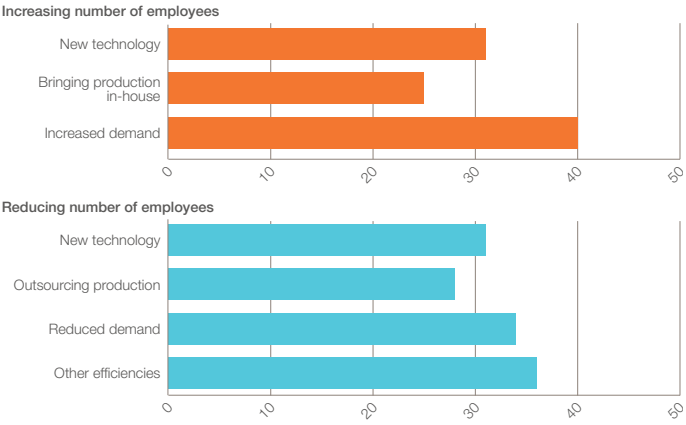
Note: Based on Populus survey of 2,500 firms in five countries. Data shows the share reporting an increase minus the share reporting a decrease in each case.

One in, one out: a picture of workforce changes as a result of globalisation and technology

In addition to asking firms about the use of various skills by their employees, our survey also asked about changes in their workforces. In particular, we asked firms if they had reduced the number of full-time employees that they employed for any one of a number of reasons, and also if they had increased them for one of a different set of reasons.

The survey revealed a high level of turnover of staff, with at least a quarter of firms saying that they had reduced staff for each of the four reasons given – reduced demand for the firm's products or services, outsourcing, the introduction of new technology, and other efficiency savings – and at least a quarter saying that they had increased staff numbers for each of one of three reasons – increased demand for their products or services, bringing elements of the production process back in-house, and the introduction of new technology.

Figure 4.1.1
Increasing or reducing employee numbers for various reasons (% of firms)



Note: Based on Populus survey of 2,500 firms in five countries.

Here, there was a clear pattern relating to the size of the firm. Broadly speaking, the more employees that a firm has, the more likely it is to be reducing its staff as a result of outsourcing, new technology and efficiency savings (but not reduced demand, where firm size does not appear to be an issue). At the same time, however, a larger firm is more likely to be increasing the number of its full-time employees due to bringing production in-house and introducing new technology.

With the exception of IT and communication firms, which are more likely to be increasing or decreasing employee numbers, there is no strong sectoral pattern for employee turnover.

What is most interesting, however, in the context of fears about globalisation and technological innovation destroying jobs, is that the proportions of firms saying that outsourcing and the introduction of new technology have led to a reduction in the number of their employees is very similar to the number saying that bringing production in-house and new technologies have led to an increase. At the aggregate level, 28 per cent of firms say outsourcing has led to a reduction in staff numbers, while 25 per cent say bringing production in-house has led to an increase; 31 per cent say new technology has led to a reduction in staff numbers, and 31 per cent say that it has led to an increase. Furthermore, this pattern of matching increases and decreases is repeated across most industries. This suggests economists' worst fears about job losses as a result of structural change might be misplaced. There may be a lot of churn in the labour market, but a pattern of net change in either direction is difficult to detect.

Conclusions

It would be wrong to attempt to draw very strong conclusions from the results of one survey of firms, but this one has two insights to add to the debate about the changing nature of the European workforce.

First, the worst fears about outsourcing as a result of globalisation and technological change leading to reduced aggregate demand for human employees across Europe might be misplaced – at least so far. The survey suggests that just as many firms are increasing the number of employees that they employ due to taking work back in-house and new technology as are reducing numbers due to outsourcing and technological innovation.

Second, however, there is some support for the idea that globalisation and technological innovation are causing a polarisation of the workforce. Although the survey does not allow an assessment of polarisation as it is usually conceived – the growth of high- and low-skilled jobs at the expense of mid-skilled ones – it does reveal polarisation in skills use by industry. The workforces of some industries are becoming ever-more skilled, while another group of industries, in particular hospitality and leisure and retailing, appear to have settled for a low-skill equilibrium. While policymakers are right to seek to ensure that there is an adequate supply of skilled workers for the first group of industries, if they are concerned about increasing productivity and real wage growth across the whole of their economies, and so preventing increased income inequality, they also need to devote more of their efforts to finding ways of helping and encouraging firms in the low-skill sectors to raise their game.

‘Even at its most benign, technology is disruptive: whole categories of work become redundant; there are winners and losers; fortunes are made and lost; politics and power structures change; and deep, long-lasting social changes are set in motion.’

Diane Coyle

The industrial structure of European economies and the types of work that they support are changing. This change takes different forms in different countries but there are some common themes across the continent.

Some of the changes are cyclical, the result of recession followed by a stuttering recovery. But other changes are the result of major structural forces operating in the global economy: the rapid pace of technological innovation, globalisation and demographic change.

The purpose of this collection of essays is to highlight the most likely trends in employment across Europe over the next 10 years, and to find out how experts think policymakers, firms and individuals should respond.

Featuring contributions from:

Terence Hogarth and Rob Wilson, Jonathan Wadsworth, Andries de Jong and Mark ter Veer, Matthew Whittaker, Peter Glover and Hannah Hope, Michael J Handel, Werner Eichhorst, Michael Fischer and Jörg Bergstermann, David Brady, Thomas Biegert and Sigurt Vitols, Thor Berger and Carl Benedikt Frey, Steve Bainbridge, Stefana Broadbent, Sara de la Rica, Henning Meyer, Diane Coyle, Alan Manning, Donald Storrie, Tony Dolphin

POSITIVE IDEAS
for CHANGE