

Edited by Lorenzo Pupillo, Eli Noam, and Leonard Waverman

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Labor

The Impact of the Internet on Employment



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Leonard Waverman
Editors

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To the Next Generation

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Contents

1	Introduction	1
	<i>Lorenzo Pupillo, Eli Noam and Leonard Waverman</i>	
Part I The Impact of Technological Change on Jobs		
2	ICT Investments and Labour Demand in OECD Countries	21
	<i>Vincenzo Spiezia</i>	
3	A One-Sector Model of Robotic Immiserization	39
	<i>Jeffrey D. Sachs, Seth G. Benzell and Guillermo Lagarda</i>	
4	Routinization and the Labour Market: Evidence from European Countries	51
	<i>Federico Biagi, Paolo Naticchioni, Giuseppe Ragusa and Claudia Vittori</i>	
5	Labor Markets in the Digital Economy: Modeling Employment from the Bottom-Up	71
	<i>Jonathan Liebenau</i>	
6	The Impact of the Broadband Internet on Employment	95
	<i>Raul L. Katz</i>	

x	Contents	
7	The Impact of the Internet on Employment and Income in the US Media and Entertainment Business <i>David Viviano</i>	109
Part II Internet Economic Fundamentals and Their Impact on Economy and Distribution		
8	Inequality and the Digital Economy <i>Eli Noam</i>	117
9	Job Losses and the Middle Class: Canada and the USA, and the Possible Role of ICT <i>Leonard Waverman</i>	141
10	Internet Innovations—Software <i>Is</i> Eating the World: Software-Defined Ecosystems and the Related Innovations Result in a Programmable Enterprise <i>Robert B. Cohen</i>	159
Part III Polices to Facilitate Structural and Social Adjustments without Slowing Innovation		
11	ICT Innovation, Productivity, and Labor Market Adjustment Policy <i>Robert D. Atkinson</i>	179
12	Ensuring the Education and Skills Needed for ICT Employment and Economic Growth <i>Richard N. Clarke</i>	201
13	Smart Organizations, New Skills, and Smart Working to Manage Companies' Digital Transformation <i>Andrea Iapichino, Amelia De Rosa and Paola Liberace</i>	215
14	Investigating the Potential for Micro-work and Online-Freelancing in Sri Lanka <i>Helani Galpaya, Suthaharan Perampalam and Laleema Senanayake</i>	229

15	Do Municipal Broadband Networks Stimulate or Crowd Out Private Investment? An Empirical Analysis of Employment Effects	251
	<i>Hal J. Singer</i>	
	Index	263

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List of Figures

Fig. 2.1	Effects of ICTs on employment	22
Fig. 2.2	Change in the user cost of ICT capital, 1990–2012 (<i>Source</i> Own calculations based on the OECD Productivity Database, 19 November 2015, http://www.oecd.org/std/productivity-stats/)	31
Fig. 2.3	Change (%) in labour demand following a permanent 5% decrease in the user cost of ICT capital (<i>Source</i> Own estimates based on regression output)	32
Fig. 2.4	Changes in labour demand due to growth in ICT capital (<i>Source</i> Own estimates based on regression output and the OECD Productivity Database, 19 November 2015, http://www.oecd.org/std/productivity-stats/)	33
Fig. 4.1	Trends of the RTI index. All countries	55
Fig. 4.2	Trends of the task intensity measures. All countries	56
Fig. 4.3	RTI index in the country groups	57
Fig. 4.4	Abstract (a), routine (b), and manual (c) intensities in the country groups	57
Fig. 5.1	Smartphone model (<i>Note</i> the figure is a simplified view whereas in the model all item spends are broken down and analysed into cloud type and eventually SICs)	80
Fig. 5.2	London: Accelerating tech/info growth	87
Fig. 5.3	Global digital city: London gains ground	88
Fig. 6.1	Conceptual view of comparative broadband regional effects (Only effects up to $t + 3$ are estimated.) (<i>Source</i> Adapted from Katz et al. 2010)	104
Fig. 7.1	SAG-AFTRA-covered audio-visual entertainment jobs	112

xxvi **List of Figures**

Fig. 8.1	Change in Employment Shares, 1993–2006 (<i>Source</i> Data from Goos, Maarten, Alan Manning, and Anna Salomons. 2009. “Job Polarization in Europe.” <i>American Economic Review</i> 99 (2): 58–63)	121
Fig. 9.1	Job growth and decline by skill level in the USA from 2003 to 2013 (<i>Source</i> Wells Fargo 2014)	144
Fig. 9.2	Venn diagrams, connectivity scorecard 2011, USA and Canada	146
Fig. 9.3	Contributions to US–Canada productivity gap, 2003 (<i>Source</i> Fuss and Waverman 2005)	147
Fig. 9.4	Canada: Share of hours worked 1970–2010 (<i>Source</i> Green and Sand 2013)	149
Fig. 9.5	USA: Share of hours worked 1970–2010 (<i>Source</i> Green and Sand 2013)	150
Fig. 9.6	Change in log weekly wages by percentile change from 1991 to 2001 (<i>Source</i> Green and Sand 2013, pp. 12 and 13)	151
Fig. 9.7	Change in log weekly wages by percentile change from 1990 to 2000 (<i>Source</i> Green and Sand 2013, pp. 12 and 13)	151
Fig. 9.8	Change in log weekly wages by percentile change from 2001 to 2006	152
Fig. 9.9	Change in log weekly wages by percentile change from 2000 to 2007 (<i>Source</i> Green and Sand 2013)	152
Fig. 9.10	Productivity change in the US nonfarm business sector, 1947–2014 (<i>Source</i> US Bureau of Labor Statistics)	154
Fig. 12.1	Annual investment in ICTs in the United States: 1990–2013 (billions) (<i>Data source</i> Brogan 2014)	204
Fig. 12.2	Distribution and growth of US ICT-related occupations (<i>Data source</i> Brogan 2012)	206
Fig. 13.1	New skills for the digitally transforming organization	218
Fig. 13.2	Knowledge management model	221
Fig. 13.3	Smart working as a “perpetual beta” change management journey	223

List of Tables

Table 4.1	Determinants of the RTI variable	60
Table 4.2	Determinants of the routine intensity variable	61
Table 4.3	The impact of RTI on unemployment probabilities	65
Table 4.4	The impact of task intensities on unemployment probabilities	66
Table 5.1	Estimates of UK jobs created or retained by investment in network infrastructures for 1 year	77
Table 5.2	UK jobs created or retained for 1 year by a £5 billion broadband investment	77
Table 5.3	UK jobs created or retained for 1 year by a £5 billion its investment	77
Table 5.4	Jobs	79
Table 5.5	Overview of the US smartphone service sector (<i>Sources</i> Juniper Research, AT Kearney, HSBC, IDC, Corporate reports (2011))	80
Table 5.6	Overview of the US aerospace sector	81
Table 5.7	UK (<i>Sources</i> Juniper Research, AT Kearney, HSBC, IDC, Corporate reports (2011))	81
Table 5.8	UK	81
Table 5.9	Germany	82
Table 5.10	Italy	83
Table 5.11	What's driving London's growth?	86
Table 6.1	Broadband impact on job creation (<i>Sources</i> Katz, R., and S. Suter (2009), Estimating the Economic Impact of the US Broadband Stimulus Plan, Columbia Institute for Tele-Information Working Paper; Katz, R., P. Zenhäusern, S. Suter, P. Mahler, and S. Vaterlaus (2008), <i>Economic Modeling of the Investment in FTTH in Switzerland</i> ,	

	unpublished report; Libenau, J., and R. Atkinson (2009), <i>The UK's Digital Road to Recovery</i> . LSE and ITIF; Australian government. Katz, R., Vaterlaus, P. Zenhäusern, S. Suter, and P. Mahler (2009), <i>The Impact of Broadband on Jobs and the German Economy</i> ; Columbia Institute for Tele-Information Working Paper	98
Table 6.2	Employment multiplier effects of studies relying on input–output analysis (<i>Source</i> Katz, R., and S. Suter (2009), Estimating the Economic Impact of the US Broadband Stimulus Plan, Columbia Institute for Tele-Information Working Paper; Katz, R., P. Zenhäusern, S. Suter, P. Mahler, and S. Vaterlaus (2008), <i>Economic Modeling of the Investment in FTTH in Switzerland</i> , unpublished report; Liebenau, J., Atkinson, R. (2009). <i>The UK's Digital Road to Recovery</i> . LSE and ITIF; Australian government. Katz, R., S. Vaterlaus, P. Zenhäusern, S. Suter, and P. Mahler (2009), <i>The Impact of Broadband on Jobs and the German Economy</i> ; Columbia Institute for Tele-Information Working Paper)	99
Table 6.3	Research results of broadband impact on employment in the United States (<i>Source</i> Author)	101
Table 6.4	Coefficient of broadband penetration in employment growth by sector (with significance at the 5% and 1% confidence level) (<i>Source</i> Crandall et al. 2007)	102
Table 6.5	Kentucky: Differential impact of broadband by industry sector (<i>Source</i> Shideler et al. 2007)	102
Table 6.6	Germany: Comparative effects between high broadband and low broadband counties (<i>Source</i> Katz et al. 2010)	103
Table 6.7	Kentucky: Impact of a 1% increase in broadband availability on employment and median income (<i>Source</i> Data compiled from Connect Kentucky databases, and ESRI Business Analyst Sourcebook for County demographics; Katz et al. 2012)	105
Table 6.8	Kentucky: Impact of broadband penetration by 1% on industrial sector employment (<i>Source</i> Data compiled from US Census Bureau, Connect Kentucky databases, and ESRI Business Analyst Sourcebook for County demographics; Katz et al. 2012)	106
Table 14.1	Proxies for the use and popularity of various micro-work platforms in/by Sri Lanka (<i>Source</i> Authors, based on http://www.alexacom/ and websites of the listed micro-work platforms. The Alexa ranks websites by frequency of access, by country. Registered number of participants is a count of the sellers who self-declare Sri Lanka as their country when registering on each platform)	232

Table 14.2	Awareness of and willingness to work online among Sri Lankans aged 15–40 years (<i>Source</i> Authors, based on data from nationally representative sample survey)	236
Table 14.3	Willingness to do micro-work/online-freelancing based on employment status and skills levels of Sri Lankan 15–40 years (<i>Source</i> Authors, based on data from nationally representative sample survey)	237
Table 14.4	Preference for full time vs. part-time micro-work/online freelancing (among Sri Lankans 15–40 years who are willing to do such work) (<i>Source</i> Authors, based on data from nationally representative sample survey)	238
Table 15.1	Summary of total multipliers from broadband investment	253
Table 15.2	Summary of spillover effects from broadband investment	254
Table 15.3	Number of provider-county pairs by ownership type, by download speed (December 2010)	256
Table 15.4	2010–2013 private-sector employment growth for counties served by a privately owned network provider in 2010	257
Table 15.5	2010–2013 private-sector employment growth for counties served by a muni-owned network provider in 2010	258



1

Introduction

Lorenzo Pupillo, Eli Noam and Leonard Waverman

The progress of technology in recent decades has been extraordinary. The great opportunities have been well recognised, but technology has also generated new divisions between winners and losers. In particular, information and communications technology (ICT) has been an engine of growth and transformation of economy and society but has impacted job flows and wage inequality. The result has been fear and uncertainty, and backlash. The purpose of our book is therefore to produce facts, analysis and evidence on the relationship between the diffusion of Internet and its impact on employment. The book also aims to fill a gap between academic research in this field, the cost and benefits of ICT diffusion and more general and accessible materials.

We took as our point of departure the structural transformation the world of work is currently undergoing. According to the Organization for Economic Cooperation and Development (OECD), three major forces are profoundly changing the world of work: demographic change, globalisation and technology, especially the digital revolution.¹ Among the demographic

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factors, the ageing population is capturing the attention of policymakers in the OECD countries for its impact on the affordability of health care and pension systems. These changes may suggest the need to create incentives for older workers to remain active in the labour market for a longer period of time. But such incentives may anger younger workers who feel that older workers are taking their jobs.

In the area of globalisation, the fragmentation of production processes and jobs along a global value chain is changing the occupational structure of jobs and their tasks. These powerful changes are often mistaken for the third force at work—the digitisation process. Increasing computer power coupled with the growing penetration of the Internet, Big Data, the Internet of Things (IoT) and Artificial Intelligence (AI) are profoundly changing the nature of work: by whom, where and how it will be performed.²

But what are the actual impacts of digitisation on labour? The current debate offers a variety of positions ranging from the pessimistic view of unprecedented job destruction, high rates of unemployment and massive increases in inequality to the optimistic idea that employment will adapt to the new technologies and that complementarities between humans and machines will generate new jobs and opportunities.

The most pessimistic study on the impact of digital technologies on future work is by Carl Benedikt Frey and Michael Osborn (2013). They evaluate the effect of what they call “computerization” on different occupations. They find that 47% of the total US employment can be classified in the “high-risk” category for becoming automated and therefore likely to disappear. A similar calculation for the UK finds a figure of one-third of jobs at high risk by automation over the next decades. However, their work has been criticised by a paper from the OECD (Arntz et al. 2016) claiming that occupation-based approaches tend to overestimate the impact of job automation, since occupations categorised as “high risk” may contain many tasks that are difficult to automate. Therefore, following the task-based approach instead of the broader occupational analysis, the OECD researchers’ findings reduce the pool of jobs at high risk across the OECD countries to an average of only 9%.

A much more optimistic approach is suggested by the McKinsey Global Institute’s report (2011), which concludes on the basis of its global SME survey that the Internet has created 2.6 jobs for every one job destroyed.³ Enrico Moretti (2012) follows the path of digital technologies as powerful catalysts for job creation, and observes that high-tech jobs trigger a multiplier effect, increasing employment and salaries in non-high-tech sectors: one high-tech job creates five complementary non-high-tech jobs, both in skilled occupations (lawyers, teachers) and in unskilled ones (waiters, carpenters).

Beyond the issue of the net impact on employment, which our book deals with in several chapters, there are also fundamental questions related to the structural changes in the workplace that affect the nature of work itself. One of the most discussed issues is job and wage polarisation. As discussed in Chapter 3, a study by Autor et al. (2006) shows that the US labour market has become increasingly polarised both in terms of occupations and wage distribution between high-skilled, conceptual, non-routine jobs and low-skilled, manual, but non-routine jobs at the opposite end of the jobs/income spectrum. The jobs most at risk from IT, however, are the routine, middle-skilled jobs, set in the middle of the jobs or wage distribution. This process is explained by the hypothesis that computers substitute for workers in carrying simple cognitive and manual activities (“routine” tasks), while computers complement workers in carrying out problem-solving and complex communication activities (“non-routine” tasks). Goos et al. (2009) show these findings for Europe. The jobs and wages polarisation has determined what has been called the great “hollowing out” of the middle class: higher paying jobs requiring high skills and creativity have proliferated; demand for low skills, manual jobs not replaceable by computers has also increased; but middle skills, middle-class jobs like bookkeeping, clerical work and routine manufacturing jobs, have been substituted by computers and the Internet. These processes combined with some of the effects of globalisation also have strong socio-economic implications, which have contributed to recent seminal political outcomes such as the Brexit vote in the UK, Trump’s election in the United States and the rise of populism in Europe.

This labour market process of substitution of computers for workers to execute routine jobs, called routinisation and often associated with labour market polarisation, seems to signal the deeper and more structural effects of how digitalisation will affect our lives. According to Brynjolfsson and McAfee (2011, 2014), the technological progress is “at an inflection point – the early stages of a shift as profound as that brought on by the Industrial Revolution”.⁴ This transformation brings a bounty of innovation related to the exponential, digital and combinational nature of the new digital technologies. While we have experienced so far only the transformation of the way in which we communicate, most of the gains from the digital transformation are still ahead of us. However, with the bounty brought by these technologies also comes the tendency to replace human capital in skilled tasks once considered safe from automation.

But is this not a scenario we have already witnessed over the past two centuries? Technological innovations have always disrupted the job market, but after a period of labour turmoil, previous technological revolutions have

brought more jobs and prosperity. The question now is: *Is it different this time and if so, why is that the case?* This question resides at the centre of Nigel M. de S. Cameron's 2017 book "*Will robots take your job?*". Two dimensions may make it reasonable to think that this wave of technological disruption could, in fact, be different: *time and scale*.

We are in the midst of a transition to a digital economy, and there is widespread consensus that the transformation brought by the digital technologies in the economy and society today is proceeding *at much faster speed* than those generated by previous waves of technologies.⁵ Although this digital transformation started in the middle of the last century, the pace of change has accelerated as digital infrastructure is further deployed and powerful devices like smartphones connect people everywhere at any time.⁶ Tom Standage, digital editor for *The Economist*, interviewed for a Pew Research on the future of jobs stated:

Previous technological revolutions happened much more slowly, so people had longer to retrain, and [also] moved people from one kind of unskilled work to another. Robots and AI threaten to make even some kinds of skilled work obsolete (e.g., legal clerks). This will displace people into service roles, and the income gap between skilled workers whose jobs cannot be automated and everyone else will widen. This is a recipe for instability.⁷

The McKinsey Global Institute states that AI is contributing to a transformation of society "happening ten times faster and at 300 times the scale, or roughly 3000 times the impact" of the Industrial Revolution.⁸ The speed of this technological change is linked to the exponential trends in technology development and its evolution may be faster than our reaction capacity. According to some observers, the acceleration of computer hardware over decades, fuelled by Moore's Law, has allowed us to "remain on the steep part of the S-curve for far longer than has been possible in other spheres of technology".⁹ All this means that it is difficult to predict what will happen and that the changes in the future will likely be massive.

The breadth of change is major and the impact of technological change is more pervasive than past changes that were linked to the diffusion of other technologies. Their impact is much more widespread than in the past. All sectors of the economy are involved. The example of self-driving vehicles is a case in point. Not only will many driving jobs disappear (truck, bus and taxi drivers), but also with fewer vehicles purchased there will be an impact on car manufacturing, the petroleum industry, farming (ethanol) and the auto insurance industry. Greater safety will also have an impact on the health care