

Selected Issues of the Public Sector
Spring 2016

**The future of labor and
alternative forms of work**

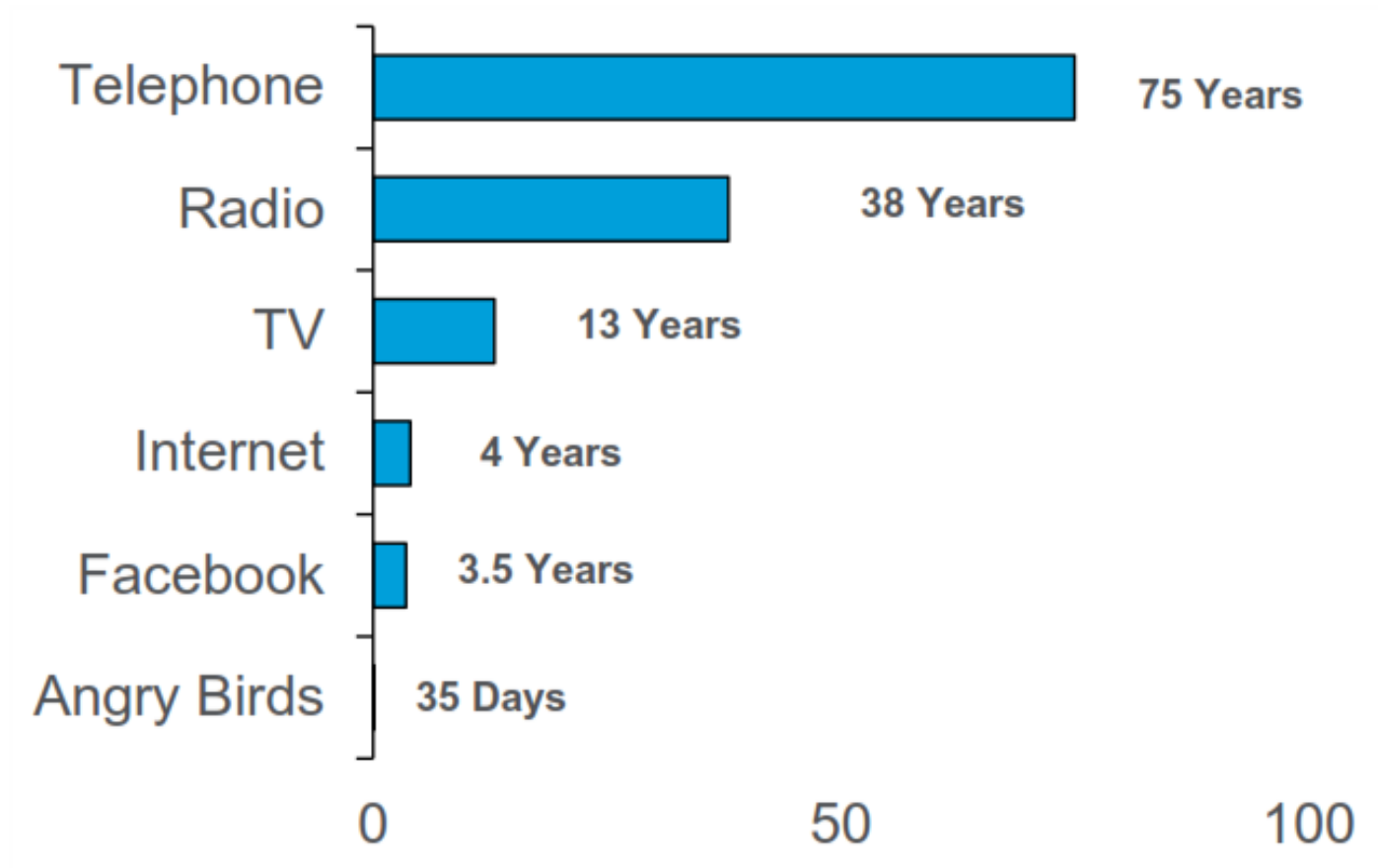
Week 11

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TECHNOLOGY AND EMPLOYMENT

Diffusion of technology: time to reach 50 million users



Source: Citi Digital Strategy Team

The ruling elite often blocked technological progress

- Emperor Vespasian (AD 69) denied the use of machine for transporting columns to capitol
“How will it be possible to feed the populace?”
- Queen Elizabeth in 1589 denied a patent to William Lee of the stocking frame knitting machine because of her concern for the employment security of hand knitters. French King Henry IV. granted a patent.
- Britain passed law in 1769 making the destruction of machinery punishable by death.
- Nowadays technological adoption is slowed by regulatory concerns and political activism (e.g. Uber).



Berlin's government legislates against Airbnb

- A new law – Zweckentfremdungsverbot - became effective on 1 May 2016.
- Berlin began restricting private property rentals through Airbnb and similar online platforms. City attempts to keep housing affordable for local people.
- The city has appealed to the “civic spirit” of residents, asking them to anonymously report suspected misuse online.
- Offenders can face fines of up to €100,000.

Jobs that machines can do

- Supermarkets now include self-checkout points to replace the cashiers, people get cash out from an ATM instead of a bank office and airlines encourage passengers to check in online rather than at the desk at the airport.
- People should be happy that a lot of these jobs have actually disappeared.
- Traditionally, routine tasks have been at risk of being replaced by technology but non-routine work has been considered safe.
- Machine learning, mobile robotics and big data computers are capable of doing more and more tasks that have previously seemed impossible.

The replacement robots are in clear sight

- Information technology affects workers high in the education and skill distribution.
Think how Google reduces the need for librarians and research assistants, or the way massive open online courses reduce the need for professors and lecturers; the chess-playing computer Deep Blue, beating Kasparov as world champion; Watson, the artificially intelligent computer system, becoming the greatest Jeopardy player; MOOC (Massive Open Online Courses) are far less expensive than hiring full-time faculty to lecture students.
- Short reports and sports commentary are written by the use of algorithms.
- The US online legal advice and document drafting service legalzoom.com is replacing law firms.

Red Sox Defeat Cardinals 3-1, Lead World Series 3-2

October 29, 2013 2:44 PM
Automated Insights



Jon Lester went 7 2/3 innings yielding just four hits and Koji Uehara closed it out in the ninth as Boston got past St. Louis, 3-1. St. Louis had a batting average of just .138 and a wOBA of .166.

INVESTING | 4/19/2012 @ 1:08PM | 11,876 views

Forbes Earnings Preview: Apple

Clip slide

by Narrative Science

+ Comment now

Analysts have become increasingly bullish on **Apple (AAPL)** in the month leading up to the company's second quarter earnings announcement scheduled for Tuesday, April 24, 2012. The consensus earnings per share estimate has moved up from \$9.60 a share to the current expectation of earnings of \$9.86 a share.

What to Expect:

8

f Share

49

Tweet



Are truck drivers out of job?

- Truck driving is currently the most popular job in 29 states in the US (3.5 million drivers).
- Self-driving trucks don't have to stop for long mandatory breaks after spending hours on the road.
- Up to 4,000 lives each year are lost in crashes with large trucks.
- Study shows that 47% of total employment in the US is endangered by automatization.



WALL-E (2008)

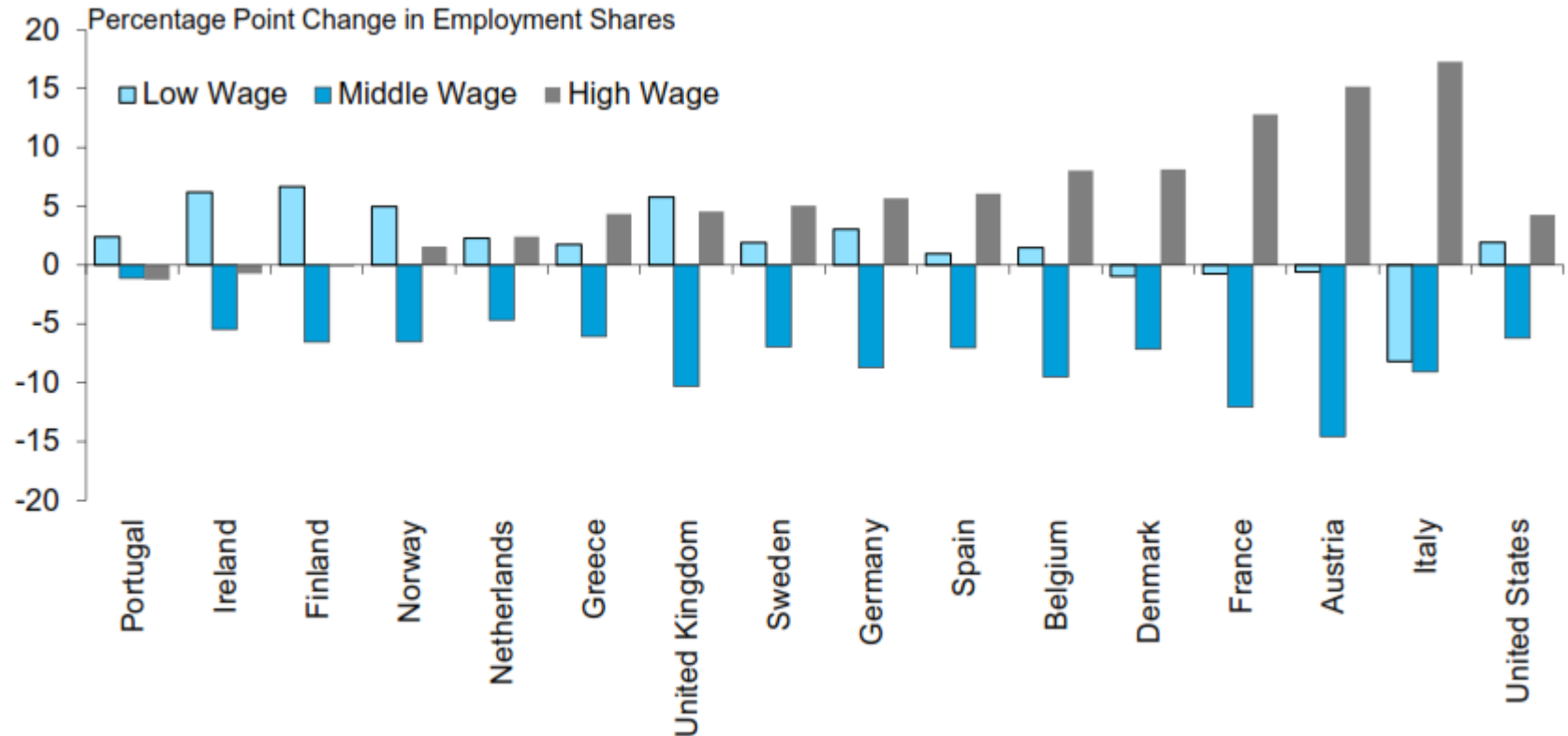
Living with robots

- Robots have the potential to greatly improve the quality of our lives at home, at work, and at play.
- Today's robots have limited capabilities and limited applications.
The car industry automates approximately 80 percent of its assembly processes but it is only ten percent in electronics.
- By working together, robots and humans can augment and complement each other's skills.
- Robots may well support people by doing physically difficult or tedious jobs: stocking shelves, cleaning windows, or sweeping sidewalks.

The hollowing out of the labour force

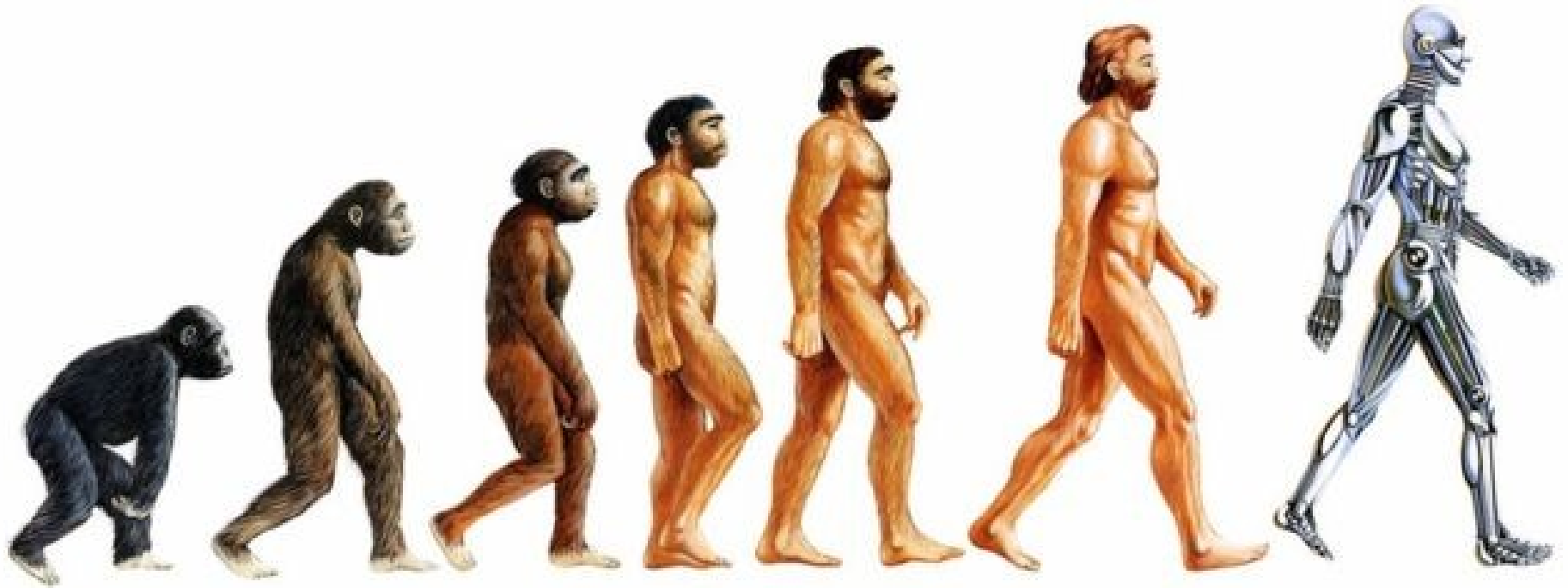
- Employment growth has been most robust at the highest and lowest ends of the skills spectrum.
- High- and low-skilled jobs involve tasks that are non-routine, requiring either cognitive capacity or complex but manual tasks to complete them.
- The middle skill jobs, in contrast, contain the highest concentration of routine tasks and are thus relatively easy to automate.
- Workers downskill fast and upskill slow.

Change in employment shares by occupation, 1993-2006



Source: Autor (2010). Note: Wage categories are based on average wage levels at the start of the period measured

Computerisation of occupations



- The paper *The Future of Employment: How Susceptible are Jobs to Computerisation* (Frey & Osborne, 2013) predict the probability of computerisation of over 700 different occupations.
- The task requiring *Originality* combined with *Service Orientation* are most difficult to automate.
- Automatization depends on relative costs and other factors - humans will prefer certain jobs regardless if a machine could perform the same tasks (e.g. athletes)
- For some occupations it might make sense to replace certain tasks with machines but not the job as a whole.

Computerisation of occupations

JOBS MOST AT RISK

Telemarketers

Title Examiners, Abstractors, and Searchers

Mathematical Technicians

Insurance Underwriters

Watch Repairers

Cargo and Freight Agents

Tax Preparers

Photographic Process Workers and Processing Machine Operators

New Accounts Clerks

Library Technicians

Data Entry Keyers

Timing Device Assemblers and Adjusters

Insurance Claims and Policy Processing Clerks

Brokerage Clerks

Order Clerks

Loan Officers

Insurance Appraisers, Auto Damage

Umpires, Referees, and Other Sports Officials

Tellers

Etchers and Engravers

Packaging and Filling Machine Operators and Tenders

Procurement Clerks

Shipping, Receiving, and Traffic Clerks

Milling and Planing Machine Setters, Operator

Credit Analysts

Parts Salespersons

Claims Adjusters, Examiners, and Investigators

Driver/Sales Workers

Radio Operators

Legal Secretaries

Bookkeeping, Accounting, and Auditing Clerks

Inspectors, Testers, Sorters, Samplers, and Weighers

Models

Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop

Credit Authorizers, Checkers, and Clerks

Payroll and Timekeeping Clerks

Agricultural and Food Science Technicians

Telephone Operators

Real Estate Brokers

File Clerks

Counter and Rental Clerks

Prepress Technicians and Workers

Motion Picture Projectionists

Camera and Photographic Equipment Repairers

Cashiers

Ophthalmic Laboratory Technicians

Log Graders and Scalers

Pesticide Handlers, Sprayers, and Applicators, Vegetation

Grinding and Polishing Workers, Hand

Crushing, Grinding, and Polishing Machine Setters, Operators, and

Tenders

Dental Laboratory Technicians

Computerisation of occupations

JOBS LEAST AT RISK

Recreational Therapists
Emergency Management Directors
First-Line Supervisors of Mechanics, Installers, and Repairers
Mental Health and Substance Abuse Social Workers
Audiologists
Healthcare Social Workers
Orthotists and Prosthetists
Occupational Therapists
First-Line Supervisors of Fire Fighting and Prevention Workers

Dietitians and Nutritionists

Choreographers
Sales Engineers
Instructional Coordinators
Physicians and Surgeons
Psychologists, All Other

Elementary School Teachers, Except Special Education

Dentists, General
First-Line Supervisors of Police and Detectives
Medical Scientists, Except Epidemiologists
Education Administrators, Elementary and Secondary School
Clinical, Counseling, and School Psychologists
Fabric and Apparel Patternmakers
Human Resources Managers
Set and Exhibit Designers
Recreation Workers
Training and Development Managers
Speech-Language Pathologists

Computer Systems Analysts
Social and Community Service Managers
Curators
Athletic Trainers
Medical and Health Services Managers
Preschool Teachers, Except Special Education
Farm and Home Management Advisors
Special Education Teachers, Secondary School
Anthropologists and Archeologists
Secondary School Teachers, Except Special and Technical Education
Foresters
Clergy
Educational, Guidance, School, and Vocational Counselors
Career/Technical Education Teachers, Secondary School
Registered Nurses
Rehabilitation Counselors
Teachers and Instructors, All Other
Education Administrators, Postsecondary
Marine Engineers and Naval Architects
Makeup Artists, Theatrical and Performance
Mechanical Engineers
Industrial-Organizational Psychologists
Microbiologists
Logisticians
Pharmacists
Sales Managers
Coaches and Scouts

- It is true that robots are getting very good at a whole bunch of jobs and tasks, there are still many categories in which humans perform better.
- Robots can aid in the creation of new and better jobs for humans. We do expect that some jobs will disappear, other jobs will be created and some existing jobs will become more valuable.

FUTURE OF PROFESSIONS

- The professions exist because they help us to solve problems that we do not have the expertise or the time to handle ourselves. **It just happened so that, in the 20th century, the best way to do this involved face-to-face interaction with other human beings.** But in the 21st century, we'll find more affordable and accessible ways of doing so.
- As the machines are becoming increasingly capable there are now systems that can do much of this without human experts.

Two scenarios

1. Professionals use new systems to help them work in the traditional way
2. The introduction of a range of increasingly capable systems will entirely replace the work of traditional professionals.

For now, these two scenarios develop in parallel. But in the long run the second one will dominate.

Don't fear the robots, technology also creates jobs

- The magnitude of new jobs created from the arrival of new technologies is small.
- In 2010 only about 0.5% of the US workforce worked in new industries. These workers are high educated and highly paid.
- Location is more important in the digital age, cities with larger pools of skilled workers benefit (the rise of skilled innovation cities).

The future world of labor

- Traditional 'linear' careers become an exception
- Lifelong employment will diminish
More flexible modes such as freelance, (dependent) self-employment, on-call work and project-based temporary jobs will be more common.
- The decline of routine jobs
Many jobs will become 'richer' and more intrinsically interesting or rewarding than the jobs in the past with routine and repetitive tasks.
- The workforce will be more diverse
The increase of female, migrants and older workers.
- Increasing heterogeneity in the labor market
New creative occupations and the 'sharing economy'

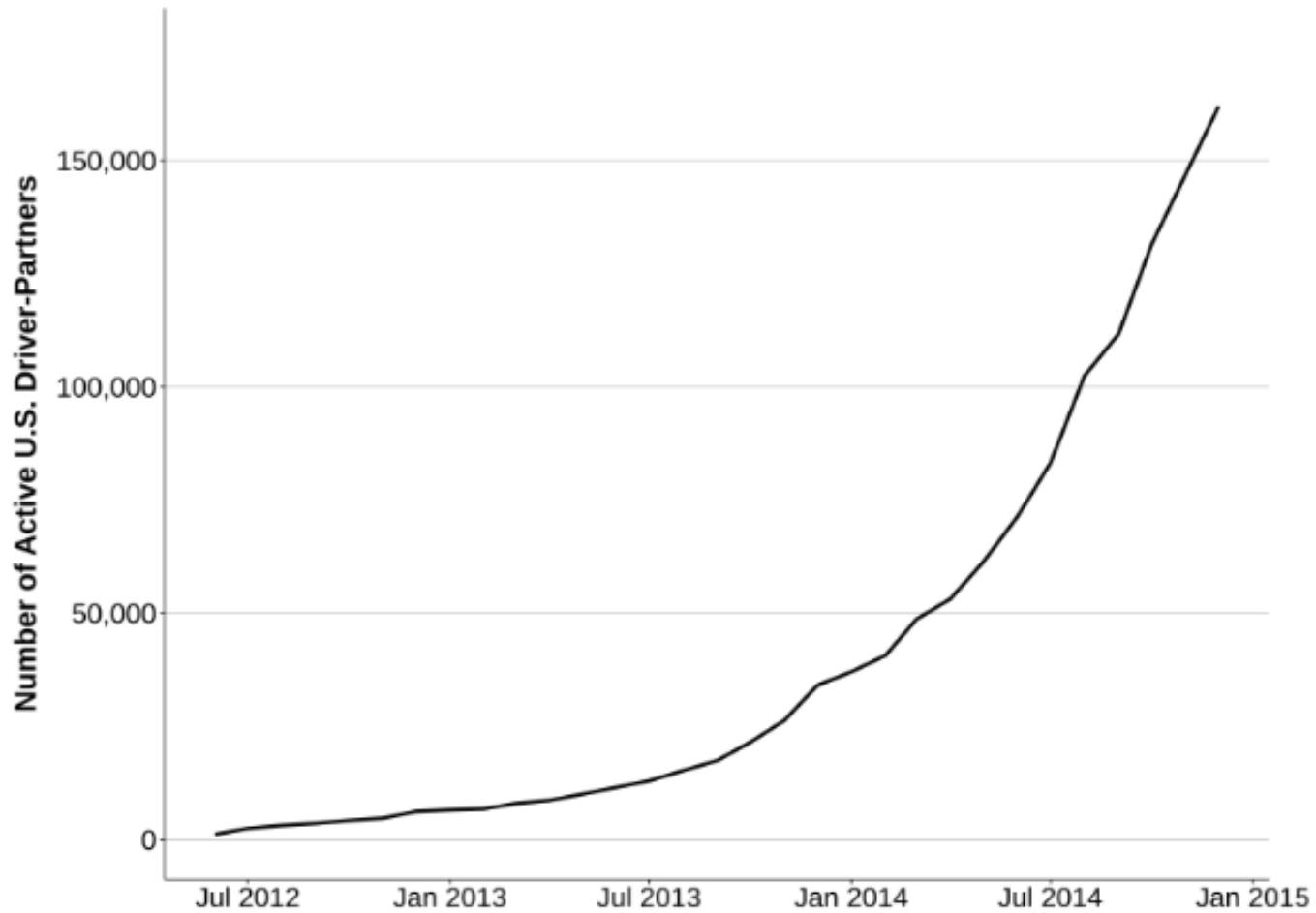
Self-employment: the new normal

- There is no better time to be an entrepreneur with an insight than today, because you can use technology to leverage your invention.
- Digital economy allows people everywhere to reach global markets.
- E-entrepreneurship typically requires less capital (e.g. crowdfunding)
- Large increase in self-employment since 2008 has been in professional occupations.
- Self-employment is becoming increasingly a preference (e.g. Be your boss!).

The sharing economy

- Benefits talented entrepreneurs.
- The Internet and smartphones make it cheaper to match supply and demand.
- Peer-to-peer services to share cars, accommodation, car-parking spaces, bicycles, musical instruments, garden equipment, household appliances and other items.
- Technologies connect people and build trust.

Uberization of economy



In-class debate

Uber is typical of what's becoming known as the sharing economy.

1. Is Uber model making our lives any better?
2. Do we need new legal classification and social contracts for “independent workers”?

The new challenges

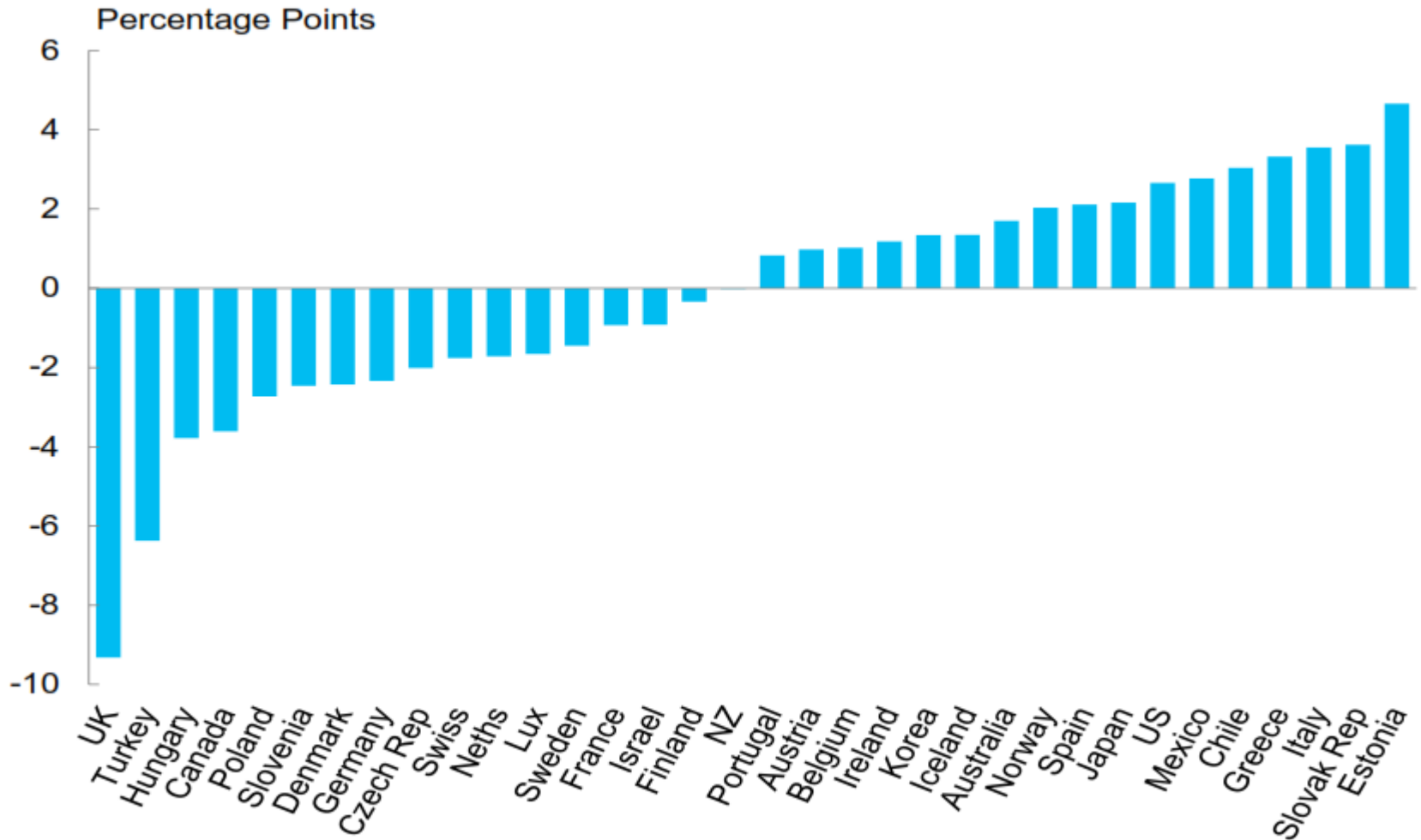
- Digital technologies will continue to accelerate but our skill, organizations, and institutions are lagging. Digital literacy is crucial
47% of European workers have insufficient digital skills; 23% have none
- Substantial investment required for workforce up-skilling
- We need to reinvent our economy and society to keep up with accelerating technology.

Optimal policy settings to boost innovation and employment

1. Policies to reduce the cost of labour and to increase take-home pay.
2. Policies that make it easier to find jobs.
3. Policies to handle greater job precariousness and job instability.
4. Better allocation of work (flexible hours).

... but the cost labor is raising in many countries!

Figure 62. Change in tax wedge between 2007 and 2012 (for single person at 67% of average earnings, with two children)



Positive consequences

- The digital age has so far mainly benefited skilled workers as producers, it has also benefited unskilled workers as consumers, making their leisure more interesting and self-fulfilling.
- People gain affordable access to quality medical guidance and legal support
- Access to practical expertise (Wikipedia)
- What tasks ought to be not done by machine (medicine, court judge)

New professional assets to advance your career

- The accumulation of experiences from jobs, internships, and volunteering activities.
- Managing instability and uncertainty, continuous learning, mobility, flexibility and the ability to handle and interpret large amounts of data.
- Creativity and innovation