



DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT
ECONOMIC AND SCIENTIFIC POLICY **A**



Economic and Monetary Affairs

Employment and Social Affairs

Environment, Public Health and Food Safety

Industry, Research and Energy

Internal Market and Consumer Protection

The Future of Work: Digitalisation in the US Labour Market

Compilation of Briefings for the EMPL Committee



DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

The Future of Work: Digitalisation in the US Labour Market

COMPILATION OF BRIEFINGS

Abstract

This set of briefings, commissioned by Policy Department A for the Committee on Employment and Social Affairs (EMPL), will serve as input for its delegation to San Francisco and Silicon Valley in March 2016, as well as for subsequent debates of its Working Group on Digitalisation, Robotics and Artificial Intelligence.

The briefings provide background information on the US labour and social security systems compared to European practice, and cover the effect of digitalisation on job creation and job losses in the US; the skills required for the jobs of the future; and changing working conditions in the US and particularly in Silicon Valley.

This document was requested by the European Parliament's Committee on Employment and Social Affairs for its delegation to San Francisco and Silicon Valley (28 March to 1 April 2016).

AUTHORS

Daphné Valsamis, IDEA Consult
An De Coen, IDEA Consult
Valentijn Vanoeteren, IDEA Consult

RESPONSIBLE ADMINISTRATOR

Stefan H. SCHULZ

EDITORIAL ASSISTANT

Karine GAUFILLET

LINGUISTIC VERSIONS

Original: EN

ABOUT THE EDITOR

Policy departments provide in-house and external expertise to support EP committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny over EU internal policies.

To contact Policy Department A or to subscribe to its newsletter please write to:
Policy Department A: Economic and Scientific Policy
European Parliament
B-1047 Brussels
E-mail: Poldep-Economy-Science@ep.europa.eu

Manuscript completed in March 2016
© European Union, 2016

This document is available on the Internet at:
<http://www.europarl.europa.eu/studies>

DISCLAIMER

The opinions expressed in this document are the sole responsibility of the author and do not necessarily represent the official position of the European Parliament.

Reproduction and translation for non-commercial purposes are authorised, provided the source is acknowledged and the publisher is given prior notice and sent a copy.

CONTENTS

LIST OF ABBREVIATIONS	4
LIST OF BOXES	5
LIST OF FIGURES	5
LIST OF TABLES	5
EXECUTIVE SUMMARY	6
1. INTRODUCTION	9
1.1. Context of the briefings	9
1.2. Objectives of the briefings	9
2. KEY FEATURES OF THE US LABOUR MARKET	11
2.1. The characteristics of the US labour market	11
2.2. Labour market regulation and social protection in the US	16
3. THE TRANSFORMATION OF JOBS IN THE US DUE TO DIGITALISATION	19
3.1. Impact of digitalisation on skills	20
3.1.1. The evolution in the skills needed	20
3.1.2. Opposite views on digital skills gap	21
3.2. The impact of digitalisation on jobs in the US	24
3.3. The impact of digitalisation on working conditions: The rise of the gig economy	26
4. SKILLS RELATED POLICY INITIATIVES	31
4.1. Efforts made to attract qualified workers through immigration	31
4.2. Continuous investments in the educational system	33
4.3. Innovation policy supports cutting-edge technological companies	34
5. FOCUS ON SILICON VALLEY	37
5.1. The economy of Silicon Valley	38
5.2. Job dynamics in Silicon Valley	39
5.3. Research in Silicon Valley	40
5.4. The culture of Silicon Valley	40
5.5. Rising inequality in Silicon Valley	42
5.6. Discrimination issues in Silicon Valley	44
REFERENCES	46
ANNEX	50

LIST OF ABBREVIATIONS

BRAIN	Brain Research through Advancing Innovative Neurotechnologies
CSTA	Computer Science Teachers Association
EU	European Union
EPL	Employment Protection Legislation
GDP	Gross Domestic Product
ILO	International labour organisation
ITIF	Information Technology and Innovation Foundation
MGI	McKinsey Global Institute
NASA	National Aeronautics and Space Administration
NSF	National Science Foundation
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
STEM	Science, Technology, Education and Mathematics
TEA	Total Early-Stage Entrepreneurial Activity
US	United States

LIST OF BOXES

Box 1 :	Role of the US Department of Defense	16
Box 2 :	Case study: Uber	27
Box 3 :	Case study: Procter & Gamble	28
Box 4 :	Europe in Silicon Valley	38
Box 5 :	Case study: Results of the survey "The Elephant in the Valley"	45

LIST OF FIGURES

Figure 1 :	Unemployment rate in US compared to the EU	12
Figure 2 :	Evolution of the labour-force participation rates in the US and EU	13
Figure 3 :	Monthly job growth in the US	13
Figure 4 :	Share of total US employment growth since February 2010	14
Figure 5 :	Share of total US employment growth since February 2010	14
Figure 6 :	Self-employment rate 2013	15
Figure 7 :	Total early-stage Entrepreneurial Activity (TEA)	16
Figure 8 :	Index of strictness of employment protection regulation	17
Figure 9 :	Projections of educational demand by 2020 in the US workforce	21
Figure 10 :	MGI Digitisation Index	25
Figure 11 :	Employment in innovation industries	39
Figure 12 :	Creative destruction in Silicon Valley	40
Figure 13 :	Median Wages for Selected Occupations, Santa Clara County, 2014	43
Figure 14 :	The Gini Coefficient in the Bay Area, California and the US, 2007-2013	44
Figure 15 :	Income in Silicon Valley by gender and educational level	45
Figure 16 :	The number of new jobs by occupation (2014-2024)	50
Figure 17 :	Employment outlook by main industries (2015-2020)	51
Figure 18 :	Description of new immigration reform	51

LIST OF TABLES

Table 1 :	Household Income Inequality in the Bay Area, California and the United States, 2013	43
-----------	---	----

EXECUTIVE SUMMARY

Objectives of the briefings

The aim of these briefings is to analyse the **effect of digitalisation in the US on:**

- job creation and job losses;
- expectations regarding the skills required for the jobs of the future, and how the US education system and labour market respond to those (formal and informal) requirements;
- changing working conditions.

As the US West Coast economy could be considered as a 'laboratory for the future', we pay special attention to the actual situation in Silicon Valley.

Key features of the US labour market

There are large differences between the labour markets of Europe and the US, both in terms of **structure** and in terms of **performance**, which are key to understanding the difference in reactions to digitalisation.

First, the US is characterised by a lower **unemployment rate**: 5.7% at the end of 2014 compared to an EU unemployment rate of 10.2%. The literature argues that the many differences between the labour markets could explain the persistent unemployment in the EU compared to the US: weaker labour protection, the lower cost of employment, higher labour mobility or higher job turnover in the US compared to the EU, and the lower rates of payment to the unemployed. However, the overheating of the labour market in the US is tempered by a falling **participation rate**. Compared to the total working age population, the number of people at work or seeking work is decreasing in the US, while it is increasing in the EU.

Secondly, although there were on average 235,000 new jobs per month in the US in 2015, **job growth** in the US remains below the average seen before the economic crisis of 2009. Moreover, it seems that the recovery has come with stronger employment growth in **low-wage industries**, such as accommodation and food services, temporary help services, retail trade, and long-term health care. As a consequence, the US is also characterised by a **growing inequality**: an increasing proportion of workers in the US have incomes lower than the average.

Thirdly, only 6.6% of the workforce in the US is **self-employed**, compared to an EU self-employment rate of 16%. However, the US has the highest rate of **early-stage entrepreneurial activity**: in 2014, 13.8% of the working age population in the US had started an entrepreneurial activity within the previous 3 years, compared to 10.6% in the UK, 5.5% in Denmark and Spain, 5.3% in Germany and France, and 4.4% in Italy.

Finally, compared to Europe, the US labour market is characterised by **weak employment and social protection legislation**, in terms of employment contracts, working hours, minimum wage, notice of termination, paid holiday, unemployment benefits, pension benefits, health care, etc. According to the literature, this framework explains why there are more limited start-ups in the EU compared to the US.

The transformation of jobs in the US due to digitalisation

Digitalisation has a substantial impact on the labour market, by modifying skills needed, working conditions and job dynamics in the US.

Concerning **skills needs**, individuals need new digital skills to respond to employers' needs, but also to function well in society as whole. These skills range from basic digital

literacy to advanced technical skills. Moreover, it is the combination of general job-specific skills and skills related to technologies that are relevant for the job (i.e. double-deep skills) that makes individuals more employable. This is especially important for medium-skilled workers, since their jobs will increasingly disappear in favour of jobs for higher and lower-skilled workers.

While it is commonly accepted in the EU that investments in skills related to Science, Technology, Education and Mathematics (STEM) are valuable to respond to the skills needs in the labour market, there is an ongoing debate in the US about whether there is a **shortage or a surplus of STEM skills**. The US Bureau of Labor Statistics concludes that both exist, depending on the sector observed, STEM discipline and location. Since the skills shortage is most pronounced in the private sector, including Silicon Valley, companies will need to invest more in **training** to develop the digital skills of their workforce and keep **cooperating with educational institutions** to increase access to STEM education and tailor students' skills to their needs.

Concerning **job dynamics**, digitalisation has led to a **boom in tech-related jobs** (with a 31% faster growth than other expanding sectors) and **STEM-related jobs** (three times the average growth) in the US. However, employment in 'new' sectors remains limited (0.5% of the US workforce) and there are concerns about jobless growth.

Sectors with the highest degree of digitalisation - ICT, media, professional services and financial services - are expanding, but only account for 19% of total employment. The impact of increased digitalisation on **other sectors** is unclear, but there is significantly higher risk of job losses for workers with low wages.

Finally, the question of **working conditions** within the digital economy is not a big issue in the American literature or debate, given the traditionally lower level of protection. In the same way as in Europe though, digitalisation prompts major transformations in how work is organised. Due to digital data, high speed internet, audio and video technology, etc. workers have the flexibility to work at any time and from anywhere. As a result, businesses can now hire specialists on demand and keep their workforce flexible in response to fluctuations, for example in the form of freelance workers. **Platforms** designed to match companies with talent - in the form of online **gig economy** or **crowdsourcing platforms** - are an important driver of this evolution. These platforms could boost global gross domestic product (GDP) by \$2.7 trillion by 2025, mainly by increasing the labour-force participation of currently inactive people or the number of hours of work for part-timers. Despite the output gains and opportunities of digital media, potential downsides exist. There are also concerns about the **protection of gig workers**, as independent contractors are not covered by protections and benefits provided by some federal labour and employment laws.

Skills-related policy initiatives

Public policy has the ability to support the digitalisation of the labour market and promote a climate of innovation in Silicon Valley. Many initiatives have been launched to respond to arising needs in US society due to the technological revolution. In this chapter, we highlight a number of measures that have been taken in three policy fields that are key for getting the workforce ready for the increasingly digitalised labour market, namely immigration, education and R&D.

The Obama Administration has taken steps to **relax the current immigration system** in order to find foreign workers as a response to the skills shortage that diverse sectors are confronted with. Besides investing in skills supply by attracting foreign workers, policy also targets the inland education and training system. Measures are taken to **develop the digital and STEM skills** of individuals of all ages and different population groups.

Furthermore, the 'Strategy for American Innovation' has been renewed, including proposed financial support for key areas of innovation.

Focus on Silicon Valley

Silicon Valley, with its highly specific corporate culture, remains a hotspot for innovation. Its world-leading access to venture capital and large start-up ecosystem (4.5 times bigger than London's) has led to a **concentration of high-value companies**. 26% of its labour force is employed in innovation industries, and employment in these sectors in general is still rising. These innovation industries are backed with an extraordinary assembly of scientific research capacity, including 5 universities and one of the highest federal funding rates for research.

The **European economy is strongly connected to Silicon Valley** and the broader Bay Area, with Europe being the largest global investor and a strong innovation partner. There are more than 170,000 European-born residents and one third of all foreign companies in the region are European.

When we look at the impact of digitalisation on jobs and working conditions in Silicon Valley, it seems that Silicon Valley is a hotspot for **tech- and STEM-related jobs**, with the highest per capita concentration of people employed in these occupations. This digitalised economy is characterised by a very strong process of creative destruction, with the opening of around 3,000 innovative companies and the closing or moving out of 2,500 in just one year.

Recent data also shows that Silicon Valley is characterised by an **increasing wage inequality**. Although income inequality in the US has been increasing for several decades, income inequality in California and the San Francisco Bay Area has increased at a more rapid rate than the US as a whole.

Even though Silicon Valley is well-known for innovation and meritocracy, it remains a **white and male-dominated landscape**. Only 3% to 4% tech workers are either **Black or Latino**, while they represent 41% of all private security guards in Silicon Valley, 72% of all janitorial and building cleaning workers, and 76% of all grounds maintenance workers.

Concerning **gender equality**, data shows that women are significantly underrepresented in tech jobs in Silicon Valley. Only 15% of venture capital companies have even a single woman serving in an executive role; fewer than 3% have a female CEO; and just 6% of venture capital firm partners are women. Women are not only underrepresented in tech jobs in Silicon Valley but also earn **52-61% less** than men with the same level of educational attainment. Moreover, a survey also shows that for women in tech and venture capital firms **gender discrimination** is common in Silicon Valley.

1. INTRODUCTION

1.1. Context of the briefings

Klaus Schwab, founder and Executive Chairman of the World Economic Forum, states that we are at the beginning of a Fourth Industrial Revolution, which will be more comprehensive and all-encompassing than anything we have ever seen (World Economic Forum, 2016). This possible change provides both risks and opportunities, which require a proactive adaptation by public and private actors. Several studies have shown that the net effects of digitalisation on employment are difficult to assess, but job losses in certain sectors are inevitable. Classic employer-employee relationships are also under pressure. At the same time, the transformation of jobs calls for different skills requirements which could lead to growing skill gaps and mismatch in the labour market (IDEA Consult, 2016). The impact of these transformations is specific to the industry, region and sector and depends on the ability of various stakeholders to manage the change.

The Committee on Employment and Social Affairs of the European Parliament has focussed on the European angle of these evolutions in the committee's Working Group on Digitalisation. Complementary to this, they have planned a delegation to San Francisco and Silicon Valley in late March 2016, which will provide a new perspective on the future of work. In this regard, the US West Coast economy could be considered as a 'laboratory for the future', both in terms of the enabling software it generates and the impact of its own business models on all sectors of the economy.

These briefings will act as a solid preparation for the delegation and as input for the ensuing debates in the Working Group on Digitalisation.

1.2. Objectives of the briefings

The aim of these briefings is to analyse the **effect of digitalisation in the US on:**

- job creation and job losses;
- expectations regarding the skills required for the jobs of the future, and how the US education system and labour market respond to those (formal and informal) requirements;
- changing working conditions;

paying special attention to the actual situation in Silicon Valley as a key example of these developments.

2. KEY FEATURES OF THE US LABOUR MARKET

KEY FINDINGS

There are large differences in the labour markets of Europe and the US, both in terms of **structure** and in terms of **performance**.

First, the US is characterised by a lower **unemployment rate**: 5.7% at the end of 2014 compared to an EU unemployment rate of 10.2%. The literature argues that the many differences between the labour markets could explain the persistent unemployment in the EU compared to the US: weaker labour protection, the lower cost of employment, higher labour mobility or job turnover in the US compared to the EU. However, the overheating labour market in the US is tempered by a falling **participation rate**. Compared to the total working age population, the number of people at work or seeking work is decreasing in the US, while it is increasing in the EU.

Secondly, although there were on average 235,000 new jobs per month in the US in 2015, **job growth** in the US remains below the average seen before the economic crisis of 2009. Moreover, it seems that the recovery has come with stronger employment growth in **low-wage industries**, such as accommodation and food services, temporary help services, retail trade, and long-term health care. As a consequence, the US is also characterised by a **growing inequality**: an increasing proportion of workers in the US have incomes lower than the average.

Thirdly, only 6.6% of the workforce in the US is **self-employed**, compared to an EU self-employment rate of 16%. However, the US has the highest rate of **early-stage entrepreneurial activity**: in 2014, 13.8% of the working age population in the US had started an entrepreneurial activity within the previous 3 years, compared to 10.6% in the UK; 5.5% in Denmark and Spain; 5.3% in Germany and France and 4.4% in Italy.

Finally, compared to Europe, the US labour market is characterised by weak **employment and social protection legislation**; in terms of employment contracts, working hours, minimum wage, notice of termination, paid holiday, unemployment benefits, pension benefits, health care, etc. According to the literature, this framework explains why there are more limited start-ups in the EU compared to the US and it also helps us to understand why US productivity has grown faster than in Europe as companies can more easily use ICT to restructure work.

In order to analyse the impact of digitalisation on the labour market in the US, it is important to understand the US labour market context and the main differences with the EU. There are large differences between the labour markets of Europe and the US, either in terms of institutions or in terms of performance.

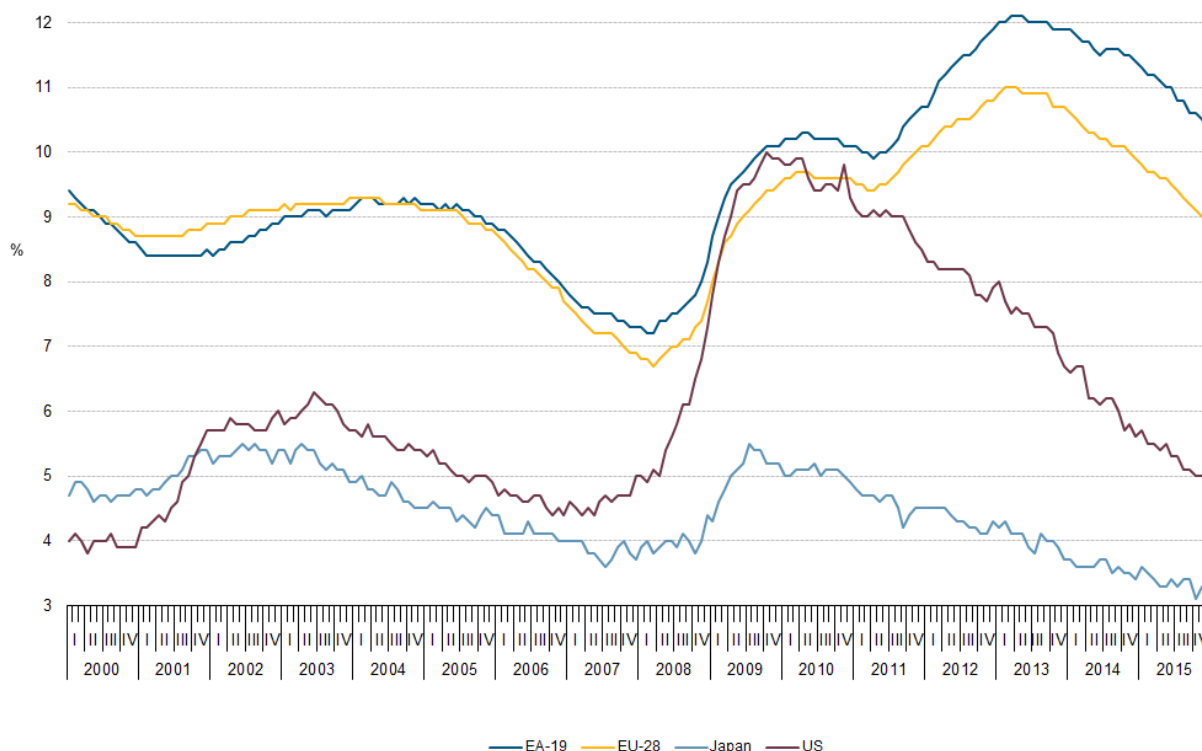
In this chapter, we first provide an insight into the main characteristics of the labour market in the US, based on a couple of interesting indicators. In the second section, we describe US labour market regulation, compared with the EU. This last section is important to understand the dynamics behind the impact of digitalisation on the US labour market.

2.1. The characteristics of the US labour market

In 2000, the **unemployment rate** in the United States was around 4%, which was considerably lower than in the EU (9.2%). It remained much lower than in the EU until early 2008, and the beginning of the financial crisis. The unemployment rate then started to increase rapidly. By the beginning of 2009 the unemployment rate in the United States had reached the same level as in the EU-28, and stayed above the EU-28 rate until the

beginning of 2010 (9.6%). Since then the US unemployment rate followed a downwards path which took it to 5.7% by the end of 2014, compared with an EU unemployment rate of 10.2%. However, even though unemployment is higher in the majority of European countries than in the United States, there are considerable variations across Europe.

Figure 1 : Unemployment rate in US compared to the EU

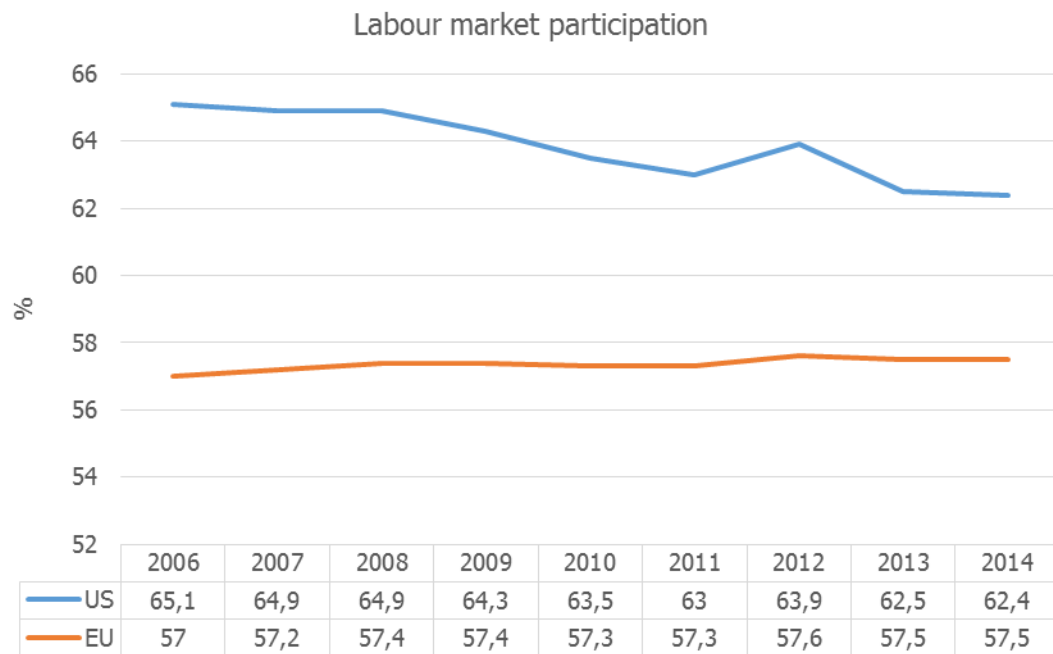


Source: Eurostat.

The literature argues that differences between the US and EU labour market could be explained by the weaker **labour protection** in the US (see also chapter 2.2.) and lower cost of employment. Other sources argue that the lower US unemployment rate may also be explained by **labour mobility**. 30% of Americans reside in a different state to the one in which they were born, while only 2.8% of Europeans have moved to a different country in the EU. Language barriers, cultural differences and non-transferable qualifications make it much harder for them to up sticks to find a new job. Another factor is the higher **job turnover** in the US compared to the EU. ILO data shows that between 2008 and 2012 the probability of moving into employment within the next month was around 7% for Europeans and 12% for Americans¹.

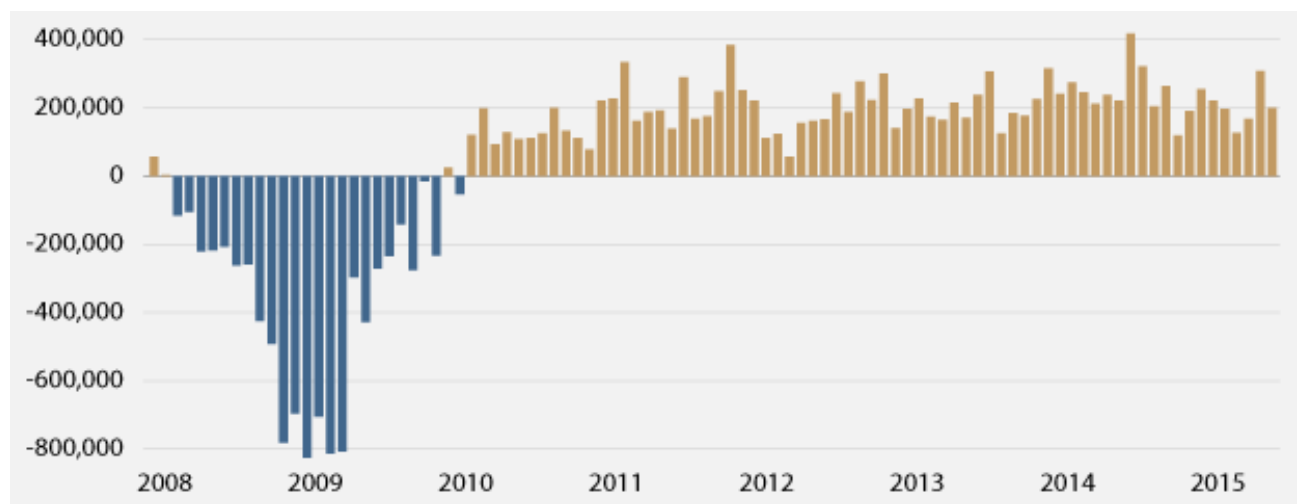
In the US, the sharp drop in unemployment has increased anxieties that the economy will soon reach full capacity and that the small available pool of unemployed workers will start to drive up wages and inflation. However, looking more closely, the picture is more nuanced. As can be observed in the figure below, the overheating labour market is tempered in the US by the falling **participation rate**. Compared to the total working age population, the number of people at work or seeking work is decreasing in the US, while it is increasing in the EU.

¹ The Economist August 2015, "Why long-term unemployment in the euro area is so high".

Figure 2 : Evolution of the labour-force participation rates in the US and EU

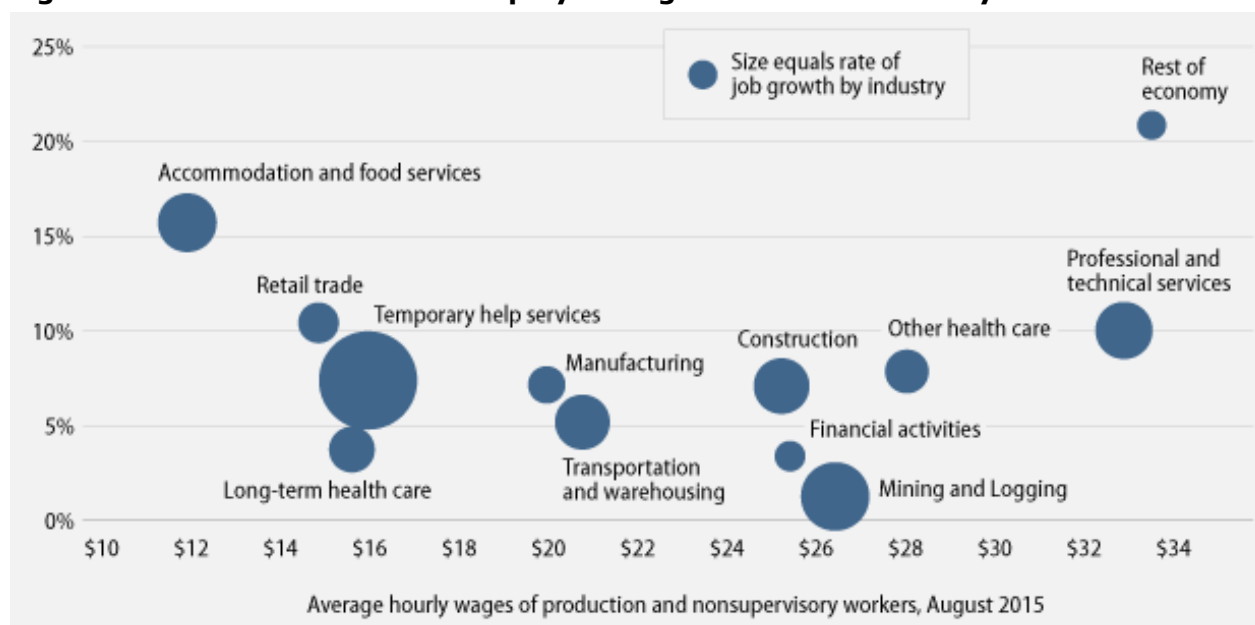
Source: IDEA Consult based on the World Bank data.

The **creation of new jobs** is also an important characteristic of the labour market. The figure below shows that between June 2009 and November 2015, there were 12.5 million additional jobs in the US. In 2015, there were on average 235,000 new jobs per month. However, job growth in the US remains below the average seen before the economic crisis of 2009 (250,000 jobs per month on average).

Figure 3 : Monthly job growth in the US

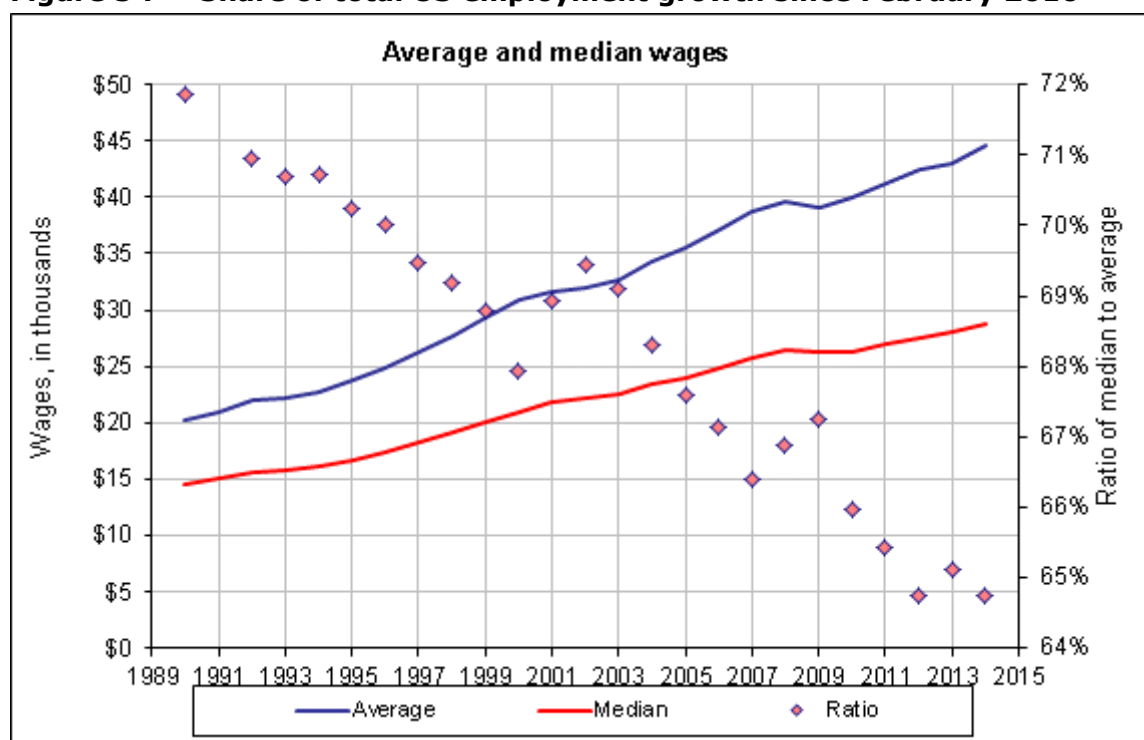
Source: US Bureau of Labour Statistics.

The US labour market has experienced significant employment recovery, but growth remains low by historical standards. Moreover, it seems that the recovery has come with stronger employment growth in **low-wage industries**, such as accommodation and food services, temporary help services, retail trade, and long-term health care. As a consequence, the US labour market is also characterised by a stagnation in **real wage growth**.

Figure 4 : Share of total US employment growth since February 2010

Source: US Bureau of Labour Statistics.

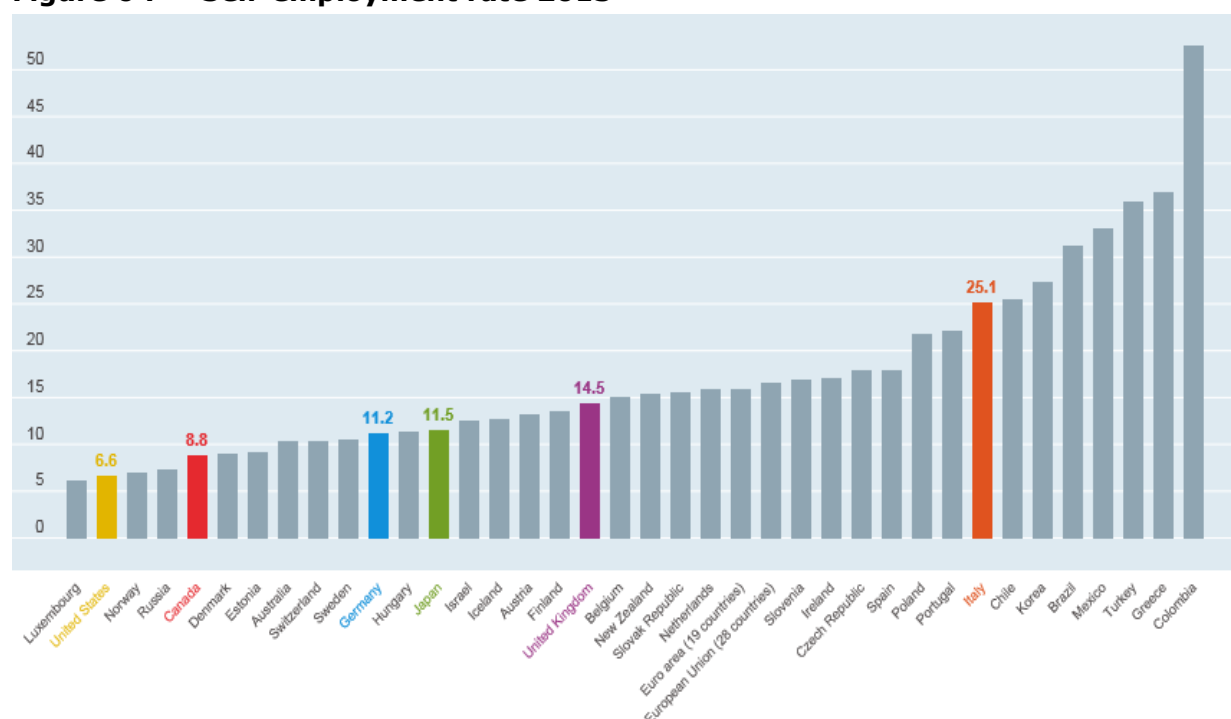
The figure below also shows that the US economy is characterised by a **growing inequality**. Since the economic crisis, the average wage has grown faster and is substantially higher than the median wage (the wage "in the middle." - half of the workers earn below this level). The ratio of median to average wage is thus decreasing. This means that a few high incomes raise the overall average income but that a larger proportion of workers in the US have incomes lower than the average.

Figure 5 : Share of total US employment growth since February 2010

Source: US Social Security data.

When we look at a particular type of employment, e.g. **self-employment**², it is interesting to note that only 6.6% of the workforce in the US is self-employed, compared to an EU self-employment rate of 16% (see Figure 6). Despite the image of a nation of small businesses and entrepreneurs, the number of self-employed workers in the United States is thus proportionately not as large as in the EU. One explanation is that this indicator only records individuals who register self-employment as their only work and excludes a lot of people who carry out independent work on the side of other work, or whose jobs are really more like gigs (see also chapter 4.2.).

Figure 6 : Self-employment rate 2013

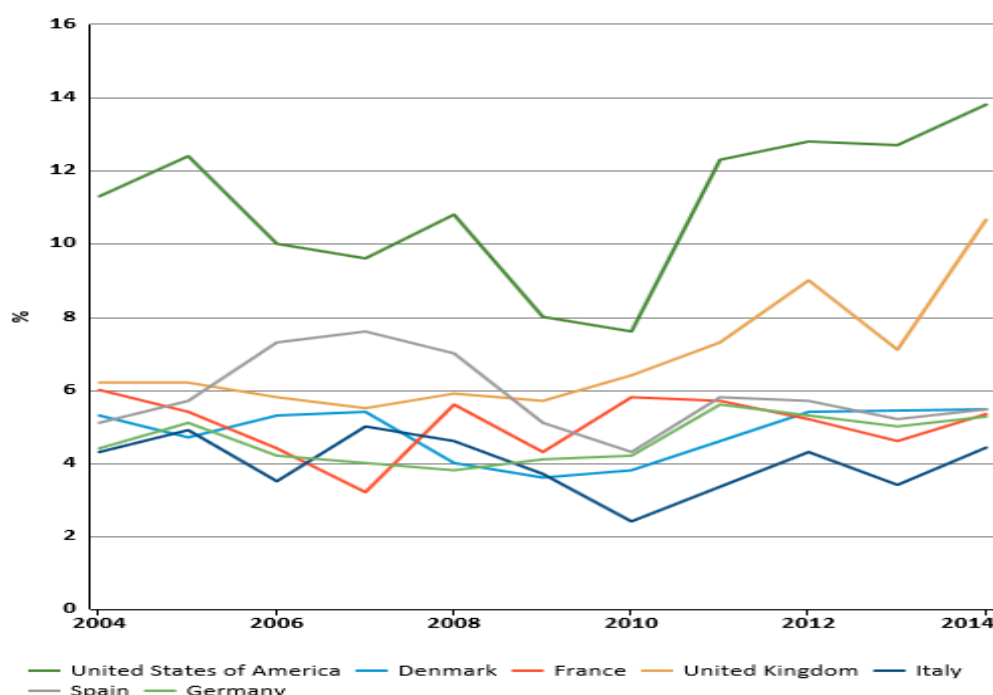


Source: OECD (2016), Self-employment rate (indicator).

The number of self-employed people is thus not the best **indicator of entrepreneurship**. We can therefore best use indicators developed by the Global Entrepreneurship Monitor. Their main indicator is called TEA (Total Early-Stage Entrepreneurial Activity), which assesses the percentage of the working age population both about to start entrepreneurial activity, and that have started working this way during the previous 3 years.

The figure below shows that, compared to a selection of EU countries, the US has the highest rate of **early-stage entrepreneurial activity**. In 2014, 13.8% of the working age population in the US had started an entrepreneurial activity within the previous 3 years, compared to 10.6% in the UK; 5.5% in Denmark and Spain; 5.3% in Germany and France and 4.4% in Italy. The rate of entrepreneurship decreased during to financial crisis of 2009 and 2010 in the US, but with a rate of 8%, it remained above the average of the selected EU countries. Since then, the rate of entrepreneurship increased continuously and even reached a higher level than before the crisis (13.8% in 2014 versus 11.3% in 2004 in the US).

² Self-employment is defined as the employment of employers, workers who work for themselves, members of producers' co-operatives, and unpaid family workers. All individuals who work in corporate enterprises, including company directors, are considered to be employees.

Figure 7 : Total early-stage Entrepreneurial Activity (TEA)

Source: Global Entrepreneurship Monitor - Adult Population Survey Measures, 2015.

Finally, the US Department of Defense plays a particular role in the US labour market but also has a role in relation to research investment in the US. This is discussed in the box below.

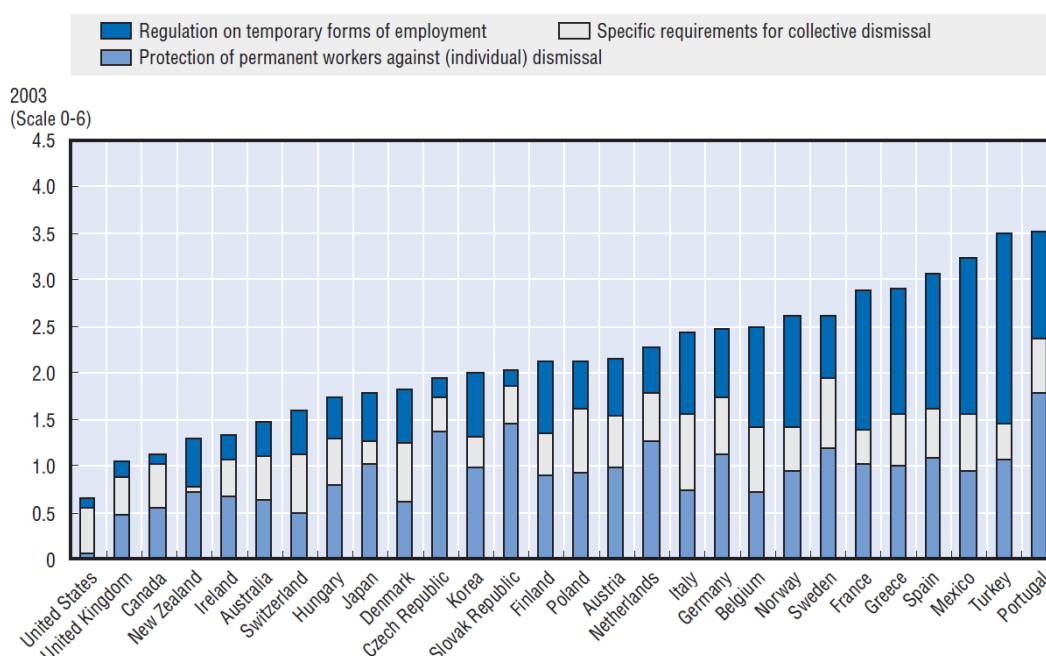
Box 1 : Role of the US Department of Defense

The US military plays a significantly larger role in the labour market than its European counterpart. It is the largest single employer of young adults and the largest vocational training institution in the country (Routon, 2014). In 2015, over 2.3 million people were enlisted in the US army, with 1.3 million on active duty (Bureau of Labor Statistics, 2015). These numbers are expected to remain stable for the coming 5 to 10 years. The military provides a large amount of entry-level positions and is a particularly popular employer during economic downturns.

Next to being a very large employer and vocational trainer, the US Department of Defense plays an important role in stimulating innovation. Professor Bracken (2015) even calls it one of the biggest sources of innovation in the United States. In Silicon Valley, the Department of Defense is referred to as the 'mother of all venture capital firms'. Many widely used technologies, such as Apple's Siri, are rooted in the Defense Advanced Research Projects Agency (DARPA) (Dembosky, 2013).

2.2. Labour market regulation and social protection in the US

Compared to Europe, the US labour market is characterised by weak employment protection legislation (EPL). As shown in the figure below, the US has the lowest EPL index of all OECD countries. In order to assess job protection of workers, three main areas are considered in the EPL index: i) difficulty of dismissal (the legislative provisions setting conditions under which a dismissal is "justified"); ii) procedural inconveniences that the employer may face when starting the dismissal process; iii) and notice and severance pay provisions.

Figure 8 : Index of strictness of employment protection regulation

Source: OECD (2004), "Employment Protection Regulation and Labour Market Performance".

Analysing labour regulation in the US in more detail, we can stress following important features of the US labour law³:

- **Employment Contracts:** In the US labour laws, there is no requirement for an explicit contract of employment. Employment can be, and is mostly, treated as being "at-will", which in practice means that either the employer or the employee can terminate the relationship at any time, for any lawful reason and without notice. However, in some States (e.g. California, Arizona and Idaho), a contract of employment can include the obligation for employers to treat employees fairly and to terminate the contract only where good cause is shown.
- **Working Hours:** Federal employment laws in the United States place no limitations on the working hours for employees. However, California state laws entitle employees to a day off every week unless the nature of the occupation makes it difficult to do so. Only some state laws (including California) regulate weekend or night work.
- **Minimum wage:** There is a Federal minimum wage and in most states also a state minimum wage. The federal government mandates a nationwide minimum wage level of \$7.25 per hour. However, 29 states have a minimum wage higher than the federal minimum. Since January 2016, the minimum wage in California is \$10.00 per hour.
- **Notice of termination:** There is no obligation in federal or state law to give advanced notice of termination other than whatever has been agreed between the company and the employee or union (except in cases of mass layoffs).
- **Paid holiday:** There are few specific requirements regarding holiday. Some states restrict employers from withdrawing vacation time once earned, even if not used in a particular year.

³ Source: <http://smallbusiness.chron.com/compare-us-labor-laws-european-labor-laws-62420.html>.

- **Wrongful discharge:** Federal statutes do not prohibit dismissal, other than in relation to dismissal on grounds of race, national origin, religion, age, sex, disability, union activity and other statutorily protected grounds.
- **Unemployment benefits:** In the US, unemployed individuals receive between 30-50% of their previous pay for a maximum period of 26 weeks (extensions are possible during economic downturns)⁴. At the end of these 26 weeks, an individual who remains unemployed is left with little in the way of a social safety net, other than through help from charities, family or friends.

Concerning the **social protection system**, the US population historically has had a somewhat unenthusiastic view of government intervention and welfare "entitlements". Private sector insurance compensates for the rather limited social insurance (Needham, C., 2013). More specially:

- **Pension system:** The government provides benefits for retired workers from 66 years old. However, it provides only a portion of a retiree's income needs. Hence, there are high levels of private pension contributions. About half of private-sector and most public employees are in pension plans funded by employers and employees through payroll taxes. Many people, especially the self-employed or those without employers' contributions, also save in tax-advantageous Individual Retirement Accounts (IRAs).
- **Health care:** There are private and public health care insurers, but private health care predominates. The 2010 Patient Protection and Affordable Care Act (ACA) is a significant regulatory change to the US health care system, aimed at reducing the number of uninsured people and reducing costs. Its main features are:
 - near-universal coverage,
 - extension of Medicaid eligibility to every American with a household income 133% below of the poverty line,
 - requirement for insurers to cover evidence-based preventive services.

Moreover, it is also important to mention that there is no unified welfare system because many important functions are the responsibility of states.

In conclusion, there are large differences in the protection of employees between the US and the EU. This legal framework is important for understanding the impact of digitalisation in the US, compared to the EU.

According to the literature and some stakeholders interviewed, this framework explains why there are more limited start-ups in the EU compared to the US. More specifically, we can mention the following cited framework conditions⁵:

- **The labour laws:** most European countries have strong laws protecting employees from being laid off which can discourage firms from taking risks in hiring workers and constrain firms from implementing technology-driven productivity measures.
- **The fragmented market:** the market in the US is much larger and homogenous than in Europe, therefore, it takes less time and money for US companies to reach a substantial amount of customers.
- **Venture capital:** in order to grow, companies need risk capital, but this is very hard to come by in Europe.

⁴ Two states - Montana (28 weeks) and Massachusetts (30 weeks) - offer benefits for slightly longer. Some states offer them for less than 26 weeks.

⁵ The Economist, June 2012, "European entrepreneurs: Les misérables ».

3. THE TRANSFORMATION OF JOBS IN THE US DUE TO DIGITALISATION

KEY FINDINGS

Digitalisation has a substantial impact on the labour market, by modifying skills needed, working conditions and job dynamics in the US.

Concerning **skills needs**, individuals need new digital skills to respond to employers' needs, but also to function well in society as whole. These skills range from basic digital literacy to advanced technical skills. Moreover, it is the combination of general job-specific skills and skills related to technologies that are relevant for the job (i.e. double-deep skills) that makes individuals employable. This is especially important for medium-skilled workers, since their jobs will increasingly disappear in favour of jobs for higher and lower-skilled workers.

While it is commonly accepted in the EU that investments in skills related to Science, Technology, Education and Mathematics (STEM) are valuable to respond to the skills needs in the labour market, there is an ongoing debate in the US on whether there is a **shortage or a surplus of STEM skills**. The US Bureau of Labor Statistics concludes that both exist, depending on the sector observed, STEM discipline and location. Since the skills shortage is most pronounced in the private sector, including Silicon Valley, companies will need to invest more in **training** to develop the digital skills of their workforce and keep **cooperating with educational institutions** to increase access to STEM education and tailor students' skills to their needs.

Concerning **job dynamics**, the **direct effect** of digitalisation **on the labour market** in the US is strong. There is a boom in both tech-related jobs (with a 31% faster growth than other expanding sectors) and STEM-related jobs (three times the average growth). However, multiple authors are concerned about 'jobless' growth. Only 0.5% of the US workforce is employed in a sector that did not exist before 2000.

The impact of digitalisation in **other sectors** varies. The most digitalised sectors, ICT, media, professional services and financial services, only account for 19% of total employment. The impact of increased digitalisation on other sectors is unclear, but there is significantly higher risk of job losses for workers with low wages.

Finally, the question of **working conditions** within the digital economy is not a big issue in the American literature or debate. In the same way as in Europe, digitalisation prompts major transformations in how work is organised. Due to digital data, high speed internet, audio and video technology, etc. workers have the flexibility to work at any time and from anywhere. As a result, businesses can now hire specialists on demand and keep their workforce flexible in response to fluctuations, for example in the form of freelance workers. **Platforms** designed to match companies with talent - in the form of online **gig economy** or **crowdsourcing platforms** - are an important driver of this evolution. These platforms could boost global gross domestic product (GDP) by \$2.7 trillion by 2025, mainly by increasing the labour market participation of currently inactive people or the number of hours worked by part-timers.

Despite the productivity gains and opportunities of digital media, potential downsides exist. There are also concerns about the **protection of gig workers**, as independent contractors are not covered by protections and benefits provided by some federal labor and employment laws.

Digitalisation has a substantial impact on the labour market, by modifying skills needed, working conditions and job dynamics. In this chapter we focus on the impact of digitalisation on the US labour market, with particular attention to the situation in Silicon Valley.

3.1. Impact of digitalisation on skills

3.1.1. The evolution in the skills needed

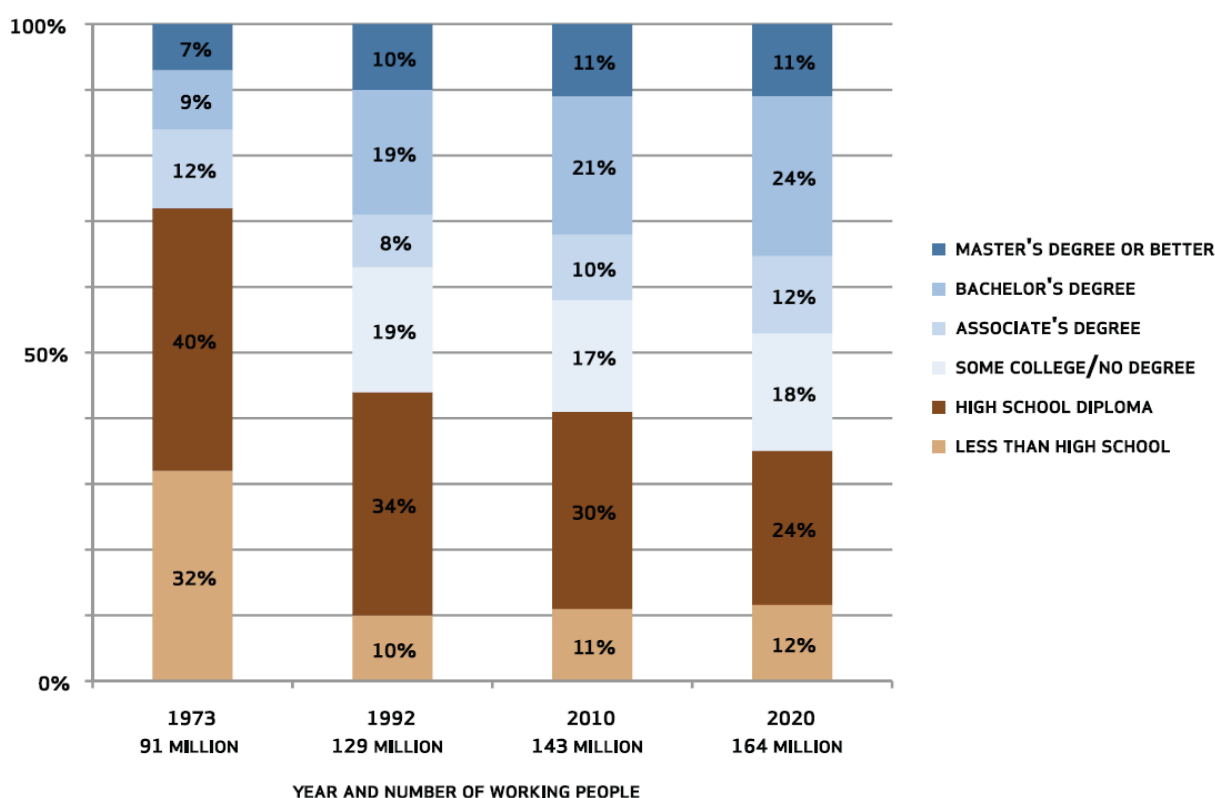
The rapid change caused by digitalisation requires businesses to adapt their business model. In many cases, this also translates into changing skill requirements. We discuss how the demand for skills evolves due to increasing digitalisation and elaborate on the skills gap the US labour market is confronted with.

Digital skills (i.e. e-skills) are defined at different levels, ranging from digital literacy to technical skills like big data analytics and app development (Capgemini, 2013). Specific technical skills in need of development in Silicon Valley are skills related to application development and web development, scriptwriting and virtualisation. Furthermore, cloud experience becomes more and more important and technical skills related to Java, .NET, PHP, and Linux are increasingly sought after⁶. While these advanced technical skills are important for improving one's job prospects (McKinsey & Company, 2015), all individuals need to be able to find, process, use and create digital content to function well in the labour market and in society as a whole (as consumers and citizens). Hence, digital literacy is on the agenda of policy makers all over the world. For a more detailed description of the spectrum of digital skills, we refer to our briefing note on the impact of digitalisation on the European labour market (IDEA Consult, 2016).

These skills need to be accompanied by cognitive and generic skills, such as creativity and communication skills, to create value (OECD, 2015). This reasoning is in line with the discourse on '**double deep skills**'. David Moschella, the Research Director for CSC's leading edge forum, defines these as the combination of job-specific skills and skills related to relevant technologies that are necessary to do that job in the current digitising economy. In other words, today's workers need a hybrid skills set of professional and IT skills to be employable and in strong demand in the US labour market. In any profession people need to be aware of the impact of technology and be able to use it to their advantage as their jobs become increasingly driven by and dependent on technology.

In terms of the evolution of required **skills levels**, job dynamics described below imply that medium-skilled routine jobs (like bookkeeping) are in decline (ILO, 2015), while there is an increasing demand for lower-skilled workers performing physical jobs (such as security personnel) and higher-skilled workers doing non-routine jobs (e.g. legal representatives) (Autor, 2010). Hence, medium-skilled workers will need to upgrade their skills to be employable and to qualify for higher-skilled jobs. However, besides older workers and people with lower than upper secondary education they are one of the groups who most lack digital skills. For the US labour market, projections from Georgetown University (Figure 9) predict that by 2020 almost two out of three jobs will require some form of tertiary education. While the share of low-skilled jobs is more or less stable; demand for medium-skilled jobs is projected to decrease over time.

⁶ <http://insights.dice.com/2014/04/16/silicon-valley-sees-skills-shortages-java-net-php-linux/>.

Figure 9 : Projections of educational demand by 2020 in the US workforce

Source: Carnevale, A.P, Smith, N., and Strohl, J. (2014). Recovery: job growth and education requirements through 2020. Georgetown University.

3.1.2. Opposite views on digital skills gap

In the EU, there is a general consensus on the importance of investing in skills related to Science, Technology, Engineering and Mathematics (STEM) in order to boost growth and promote the efficient functioning of the labour market. This contrasts with the US labour market, where stakeholders disagree on the existence of a shortage or surplus of STEM skills, including digital skills. Over the past few years, opposite views have been at the centre of the public discourse.

On the one hand, employers and politicians are convinced that the US labour market is characterised by a shortage of digital skills (Capgemini, 2015). More and more jobs require skills that workers (or applicants) do not possess. Most CEOs find it difficult to recruit workers with STEM skills (European Schoolnet and DIGITALEUROPE, 2015). Multiple observations indicate the manifestation of a 'digital skills gap':

- In the US, the number of STEM jobs is increasing more rapidly than other jobs (i.e. 1.7 times faster), while data from the Department of Education indicate that only one in six high school seniors aspire to STEM careers⁷.
- There are two job openings for each unemployed person in STEM occupations⁸.

⁷ <http://money.cnn.com/2014/09/25/smallbusiness/stem-facts/>.

⁸ [http://changetheequation.org/sites/default/files/CTEq_VitalSigns_Supply%20\(2\).pdf](http://changetheequation.org/sites/default/files/CTEq_VitalSigns_Supply%20(2).pdf).

- The OECD Survey of Adult Skills (PIAAC) shows that the US has a larger than average share of adults with poor skills in problem solving in technology-rich environments (Goodmant et al., 2013).
- The rapid pace of the technological evolution means that skills acquired during the first year of higher education are outdated by the time students graduate. By 2020, on average, 35% of the essential skills of most jobs will be skills that are not currently critical to employment (World Economic Forum, 2016).
- Silicon Valley Business Journal referred to a survey by TEKsystems (2015) of 1,300 IT leaders and IT professionals across North America discussing the skills gap. The study shows that four out of five IT leaders and IT professionals perceive a skills gap in their field of activity (i.e. IT)⁹.
- The Technology Leaders Forecast Survey asked over 200 technology executives and investors what they identified as the biggest threat to Silicon Valley continuing to be the worldwide frontrunner in technology innovation. 71% of Silicon Valley's leaders identified talent shortages and talent flight as a significant threat (27%) or a moderate threat (44%). It was perceived as a bigger threat than the competition of emerging markets in Asia, South America and Europe (DLA Piper and PitchBook, 2014).
- IT wages are 80% higher than average US wages and are growing quickly. (Nager and Atkinson, 2015)

These findings suggest that qualified workers are hard to find. This may be due to the rapid pace of technological evolutions as employers need time to update the skills of the workforce and educational institutions need time to adjust curricula in response to the needs of the labour market¹⁰. Furthermore, the predicted growth of STEM occupations and the risk of workers setting up their own business stimulate the war for talent, as do the risk of turnover (to competitors) and the retirement of babyboomers (DLA Piper and PitchBook, 2014).

These arguments are used in the debate on relaxing the US immigration policy as a way of attracting more foreign talent for vacancies that are hard to fill. At the moment, foreign graduates from US universities have only limited opportunities for staying and working in the United States (European Schoolnet and DIGITALEUROPE, 2015), even though US companies could use their qualified skills, especially in Silicon Valley. A recent survey from the Information Technology and Innovation Foundation (ITIF) concludes that almost one in two (46 per cent) innovators in the US are immigrants or the children of immigrants (Nager et al., 2016). In 2013, in Silicon Valley, more than one in two STEM workers (56%) and most software developers (almost 70%) were born outside the US (Henton et al., 2015). Professor Atkinson commented in the Courier-Post (May 10, 2015) that companies in the Silicon Valley filed over 10% of the 233,000 H-1B visa petitions (while there were only 85,000 H-1B visas available). As a result, over 15,000 visa requests made from the Valley were expected to be rejected.

In contrast, critics of immigration reforms argue that employers want to replace US workers with younger, cheaper foreign workers¹¹. Moreover, some people take the edge off the arguments above and deny the existence of a skills shortage.

⁹ <http://www.bizjournals.com/bizjournals/how-to/technology/2015/07/4-key-factors-contributing-to-the-it-skills-gap.html?page=all>.

¹⁰ <https://hbr.org/2014/08/employers-arent-just-whining-the-skills-gap-is-real/>.

¹¹ <http://www.usatoday.com/story/opinion/2014/07/27/bill-gates-tech-worker-wages-reforms-employment-column/13243305/>.

A key argument in the debate is the observation that only a minority of STEM graduates end up in STEM occupations, 26% according to data from the Census Bureau (Landivar, 2014). Another publication that supports this point of view is the study by the Economic Policy Institute that received a lot of national media attention (EPI, 2013). The analysis shows that there is only one STEM job for every two graduates with a degree in STEM fields. Those ending up in another field attribute it to a lack of jobs in their field or better opportunities in other fields.

While both studies came to the same conclusion that supply exceeds demand in the labour market, the extent of the discrepancy is twice as large according to the Census Bureau. Adams Nager from the Information Technology and Innovation Foundation contradicted their findings by pointing out that the researchers defined STEM in a very broad way, including fields like psychology, economics and anthropology. The same data show that one in two workers with a qualification in computer science were in a STEM occupation and two out of three of the others said they had a job related to their degree, albeit in other sectors of the economy.

Other information put forward as an argument in favour of a skills surplus relates to average unemployment rates and wages for STEM graduates. For instance, Carnevale and Cheah (2015) showed that in general, one in every twelve recent graduates with majors in computers, statistics and mathematics was unemployed in 2011-2012. Moreover, they found that graduates in computer and information systems, computer science and miscellaneous computer majors faced worse unemployment rates (respectively 12.10%, 7.40% and 11.30%) than their counterparts in hospitality management (5.20%), elementary education (5.10%) or nursing (4.80%). Accordingly, the Centre for Immigration Studies concluded in 2013 that the number of STEM graduates exceeded the number of STEM job openings in the US using projected data for STEM job openings and STEM degrees (2010-2020) from the Bureau of Labor Statistics (North, 2013).

Instead of having risen due to the war for STEM talent, wages have been stagnant for many STEM jobs over the last decade, not only at a national level, but also in technology centres like Silicon Valley (EPI, 2013). Wages did not (have to) rise in order to attract applicants. Others refute this assertion, for instance, by noting that all STEM wages are averaged in this study, including those of immigrants who are often younger and tend to earn less than their US counterparts¹². Nager and Atkinson (2015) even concluded that wage growth surpassed inflation rates for computer jobs over the past decade. They observed computer workers' wages were 80% higher than the average wage for all occupations in the US.

Given the opposing points of view, the Bureau of Labor Statistics (2015)¹³ looked into this matter and analysed all relevant publications, data and anecdotal information (e.g. published in newspapers). Moreover, rather than studying the STEM labour market as a whole, they examined it at a disaggregated level by making a distinction between the academic sector, the public and the private sector, but also by looking into diverse STEM fields. The results brought them to the conclusion that there is **both a STEM crisis and a STEM surplus** in the US, depending on the sector, disciplines and geographical locations of skills supply and demand. The following findings illustrate the substantial heterogeneity in the STEM labour market (focusing on STEM graduates from higher education):

¹² <http://techcrunch.com/2013/05/05/there-is-in-fact-a-tech-talent-shortage-and-there-always-will-be>.

¹³ <http://www.bls.gov/opub/mlr/2015/article/stem-crisis-or-stem-surplus-yes-and-yes.htm>.

- In academia, there is generally a STEM surplus.
- In the government sector, there is only a shortage in certain fields (like cyber security), mainly due to US citizenship requirements.
- The private sector is also confronted with a shortage in specific areas, like data scientists and software developers. The analysis shows that especially in California, there is a clear need for software developers.

Since the skills shortage is most pronounced in the private sector, it goes without saying that companies not only need to recruit qualified workers, but also have to invest in the current workforce to update their skills and optimise their employability. From that perspective, the findings of Capgemini (2013) are apparent, i.e. only one in two companies invests in developing digital skills and only one in five workers benefits from training initiatives (Capgemini, 2013).

On the job training will be a key challenge in the years ahead. Organisations will have to invest in the digital skills of their workers to meet skills demands. Capgemini (2013) stipulates that organisations need to “initiate training programs on digital tools, look at innovative recruitment methods, carry out targeted acquisitions, enter into partnerships and engage with the startup community in order to plug the digital skills gap”. In this way, digitalisation imposes diverse challenges to the efficient functioning of organisations.

On the other hand, some companies already cooperate with educational institutions to tailor students’ skills to their needs, for instance by preparing curricula. Moreover, in the United States, private or public charter schools dedicated to technology education have been created to offer students the opportunity to follow high level technology courses before going into higher education (Kolderie and McDonald, 2009). Examples are IBM-funded Pathways in Technology Early High School (P-TECH), and Microsoft’s School of the Future in Philadelphia. Accordingly, US companies co-finance non-profit organisations to democratise access to computer science and STEM education. For example, Google entered into a partnership with the Boys and Girls Clubs of America to provide young people with more opportunities in the field of computer science. Likewise, numerous other companies have provided resources to give students first-class computer science and STEM education programmes (European Schoolnet and DIGITALEUROPE, 2015).

3.2. The impact of digitalisation on jobs in the US

The impact of digitalisation on employment goes far beyond the ICT sector. First we show the evolutions in jobs directly related to the digital evolution. Secondly, we illustrate the broader effects on the US labour market.

• Direct effects

Employment in jobs related to digitalisation is booming. In the United States, the number of technology-related jobs grew 31% faster than other expanding sectors, such as health care and business services, in the last ten years (Kotkin, 2015). There is a similar trend in the wider category of STEM-related jobs, with a growth of 11.4% in the period 2004-2014. This is three times the average job growth of other sectors. Projections by the US Department of Commerce (2014) predict that this growth will continue at least until 2018.

Despite this boom in tech-related jobs, the proportion of workers employed in completely new industries is surprisingly small. A study by Berger and Frey (2015) showed that in 2010, only 0.5% of the US labour force was employed in industries that did not exist in 2000. Most of these new industries were created by the digital revolution, such as online auctions, social networking services and the streaming industry. Compared to the leading companies of the early computer revolution, the current digital unicorns created a relatively

small amount of employment opportunities. Although some of the 'old' major tech companies are in decline, IBM still employs over 350,000 workers, while Facebook had around 12,000 employees in 2015.

Davis (2015) offers some possible explanations for this possible trend towards 'jobless' growth in digital companies. Digital work requires fewer full-time employees compared with physical production. Increasing automation also contributes to this trend. Shareholders and the stock market strengthen this by valuing leaner companies. Berger and Frey (2015) fear that it could lead to a stagnation in employment opportunities in the US economy when the labour market becomes further digitalised.

It is important to note however that some workers aren't considered as 'employees' of these digital companies because the work is outsourced. Striking examples are the one million Foxconn employees who work for Apple. Platforms such as Uber also employ only a limited number of full-time employees, but the increasing number of Uber drivers reached over 280,000 in 2015 (Hall & Krueger, 2015). These numbers put the fear of jobless growth in perspective.

- **Indirect effects**

The impact of digitalisation on employment goes beyond direct employment in technology or STEM sectors. The vast majority of software developers and programmers work in industries such as manufacturing, finance and business services.

Figure 10 : MGI Digitisation Index



In the US only 7% of such workers are actually employed by software firms (Kotkin, 2015).

Therefore, it is important to see how other sectors are affected by digitalisation. The MGI Digitization index provides an interesting tool for this (McKinsey Global Institute, 2015). It is based on three major components: digital assets, digital usage and digital workers. Multiple indicators are used within each of these components. Green shows a high degree of digitalisation, while red indicates a low degree of digitalisation.

The ICT sector can be considered as the standard for full digitalisation. Media, professional services and financial services are among the most highly digitalised parts of the US economy. These most digitalised sectors only make up 19% of total US employment. Other sectors, with a larger share of the labour market (e.g. agriculture, construction, hospitality, health care and government) are lagging behind.

It is safe to assume that the lagging sectors will further digitalise in the coming years. According to MGI (2015), the rate of digitalisation will depend on four characteristics of the sector:

- Firm size: large firms are more inclined to digitalise.

- Complexity of operations: the higher the complexity, the higher the reward for digitalisation.
- Knowledge and skill content: digitalisation makes it possible to focus on the tasks that require more human capital.
- Threat of competition: disruption forces companies to invest in digitalisation.

It is difficult to directly link the degree of digitalisation to employment outlooks in different sectors. Academics don't agree on the possible effects of digitalisation and it is nearly impossible to isolate the effect of digitalisation from other drivers of job dynamics, such as the ageing population.

However, it can be interesting to compare the degree of digitalisation in different sectors to employment outlooks. The World Economic Forum (2016) projects a growth in professional and financial services for the US, which are two of the most digitalised sectors. Health care, a sector with a low degree of digitalisation, has a negative outlook for the next five years. There are some exceptions to this trend of positive outlooks in digitalised sectors, with a stable outlook for ICT and a decline in employment in the energy sector.

The expectations of the WEF for the US are in not in line with the more specific projections made by the Bureau of Labor Statistics for 2014-2024. According to them, four of the five fastest growing occupations are in the health care sector. Aside from health care, most jobs will be added in retail trade and food services, both sectors with a relatively low degree of digitalisation. These contradicting projections illustrate the challenges in identifying the impact of digitalisation on job dynamics. More detailed numbers on sector outlooks can be found in the annex.

While projections per sector are up for debate, there is more consensus on the concern that the ongoing digitalisation will affect low-wage jobs the most, across all sectors. Frey and Osborne (2013) consider jobs in transportation, logistics, the service industry and office and administrative support to be most at risk because of automation. CEA matched the predictions of Frey and Osborne (2013) with low, medium and high hourly incomes. Based on this, a job with an hourly wage below \$20 has an 83% chance of being completely automated. Medium paying jobs (between \$20 and \$40) have a 31% chance of automation, while high paying jobs (above \$40) only have a 4% chance.

3.3. The impact of digitalisation on working conditions: The rise of the gig economy

In this section, we analyse the impact of digitalisation on working conditions. However, it is important to mention that the question of working conditions within the digital economy is not a big issue in the American literature or debate.

In the same way as in Europe, digitalisation prompts major transformations in how work is organised. Due to digital data, high speed internet, audio and video technology, etc. workers have the flexibility to work at any time and from anywhere. This makes virtual companies and distributed teams, new innovative office spaces and telecommuting or telework common in the US. Digital technologies also enable fragmented business models, as information can be shared across large distances and audiences at lower cost. As a result, businesses can now hire specialists on demand and keep their workforce flexible in response to fluctuations, for example in the form of freelance workers. As a consequence, more and more individuals are employed for particular tasks for a defined period of time. In 2014, one in three Americans in the workforce was **freelance**, according to a survey by the Freelancers Union. By 2020, more than 40% of the American workforce, or 60 million people, will be independent workers — freelancers, contractors, and temporary employees. The economic impact of the 53 million Americans who are freelancing is significant —

collectively, they contribute more than \$715 billion in freelance earnings to the national economy. And that impact is expected to grow in the coming years.

However, freelance work does not completely replace salaried work. A lot of freelancers perform their activities alongside a 'classic' work arrangement.

Platforms designed to match companies with talent are an important driver of this evolution. Online talent platforms are digital tools that connect individuals to work opportunities. We can distinguish two types of platforms:

- **The online gig economy**

The gig economy is the collection of markets that match providers to consumers on a gig (or job) basis in support of on-demand commerce. In the basic model, gig workers enter into formal agreements with on-demand companies to provide services to the company's clients. Prospective clients request services through an Internet-based technological platform or smartphone application that allows them to search for providers or to specify jobs. Providers (gig-workers) engaged by the on-demand company provide the requested services and are compensated for the jobs (Congressional Research Service, 2016).

Although driver services (e.g. Lyft, Uber) and personal and household services (e.g. TaskRabbit, Handy) are perhaps best known, the gig economy operates in many sectors, including business services (e.g. Freelancer, Upwork), delivery services (e.g. Instacart, Postmates), and medical care (e.g. Heal, Pager).

Box 2 : Case study: Uber

Uber's car-sharing service is an example of how digital platforms can transform who does the work and how, resulting in both winners and losers. The creation of apps that allow more efficient connection between drivers and passengers has made it easier and cheaper for consumers to get rides where and when they need. Uber thus provides many advantages and lower prices for consumers compared with traditional taxis, which has boosted demand for ride services.

According to a recent paper by Hall and Krueger, from a base of near zero in mid-2012, more than 160,000 drivers had actively partnered with Uber in the US by the end of 2014. They received \$656.8 million in payments during the last three months of 2014. This exponential growth clearly indicates that the advent of Uber has provided new opportunities for the workforce.

However, the new apps have also disrupted the market for skilled cab drivers. Digital tools like mapping apps put knowledge into the hands of novice drivers that previously had to be accumulated through years of experience. The ability of lower-skilled entrants to compete with highly skilled and experienced drivers effectively transfers that knowledge premium from one group of workers to the other.

The paper by Hall and Krueger also shows that Uber drivers earn at least as much as taxi drivers and chauffeurs, and in many cases more. Moreover, Uber's drivers are also more similar in terms of age and education to the general workforce than taxi drivers and chauffeurs. This shows that entry barriers in traditional taxi services may prevent a broader segment of the workforce from gaining such jobs.

It is important to mention that there are a lot of discussions in the US and the EU on the status of Uber drivers: whether an Uber-driver is an independent contractor or an employee. Three drivers have sued Uber in a federal court in San Francisco, contending they are employees and entitled to reimbursement for expenses. The results of Uber's legal battle could reshape the sharing economy.

Source: World Economic Forum (2016), Digital Media and Society Implications in a Hyperconnected Era and Hall, J. V., & Krueger, A. B. (2015). An analysis of the labor market for Uber's driver-partners in the United States. Princeton University Industrial Relations Section Working Paper, 587.

On-demand companies view providers as independent contractors using their platforms to obtain referrals and transact with clients. Many on-demand companies give providers some (or absolute) ability to select or refuse jobs, set their hours and level of participation, and control other aspects of their work. In some ways then, the Gig economy can be viewed as an expansion of traditional freelance work (i.e. self-employed workers who generate income through a series of jobs and projects, but with more effective matching between the worker and the job).

- **Crowdsourcing**

Different terms are used to refer to crowdsourcing, such as crowd working, collective intelligence, human computation, peer production, etc. Compared to outsourcing, where a company or person is selected to perform a job, crowdsourcing is more open and group-based. Workers who qualify for the task and want to carry it out, can participate.

The market for crowdsourced professional services racked up over \$1 billion in 2012 and continues to grow more than 60% year on year. The names of companies using crowdsourcing techniques include not just high tech firms like Google and Microsoft, but also traditional firms like Toyota and General Electric. Using crowdsourcing provides some advantages to companies, e.g. its relatively lower price, compared to the cost of hiring a dedicated professional, but also the high number of people who are ready to work any time. However, unlike the gig economy, crowdsourcing has received limited attention in the US literature.

Box 3 : Case study: Procter & Gamble

One of the first major corporations to employ crowdsourcing, P&G has committed considerable resources to efforts that they refer to as “open innovation”. Although their vast R&D operations employ over 9,000 researchers and scientists, some intractable problems have been solved by the application of many more original thinkers spread out across the globe.

Source: <http://www.crowdsourcing.com/blog/2014/05/crowdsourcing-industry-trends-unique-ways-companies-leveraging-crowd-will-impact-future-job-markets/>

A recent analysis by McKinsey & Company suggests that talent platforms like those mentioned above could boost global gross domestic product (GDP) by \$2.7 trillion by 2025. The highest share of the gain would come from the greater labour market participation of currently inactive people and more hours available for part-timers. The rest of the gain would result from higher employment due to more and faster job matches and higher productivity as a result of better matches, all achieved through online talent platforms.

Despite the productivity gains and opportunities of digital media to actually bridge economic gaps and reduce inequality, potential downsides also exist. As digital media transforms work by increasing fragmentation, it increases the productivity and rewards of highly skilled workers while simultaneously cutting the cost of low-skilled work, and there is a very real likelihood of rising inequality in the near term as the global economy adjusts to these new realities. Highly skilled workers benefit from these more flexible work structures, but lower-skilled employees could be hurt in the short-term.

Moreover, the gig economy, and the labour and regulatory issues associated with it, is not well understood yet. There is considerable uncertainty, for example, about the number of workers in the gig economy and whether gig work is a primary or secondary source of income for the workers involved.

There are also concerns about the protection for these workers, as independent contractors are not covered by protections and benefits provided by some US federal labour and employment laws (Congressional Research Service, 2016):

- **Minimum Wage.** Most workers covered by the Fair Labor Standards Act (FLSA) are entitled to a minimum hourly wage, which is \$7.25 per hour. In addition, more than half of the states currently have minimum wage rates for FLSA-covered workers that are above the federal rate. In contrast, for independent contractors, there is no guaranteed minimum hourly wage.
- **Overtime Compensation.** The FLSA does not limit work hours; rather, it requires additional payment for hours worked in excess of 40 per working week. Independent contractors are not entitled to additional compensation for hours worked in excess of 40 per working week.
- **Unemployment Compensation.** Whereas the specifics of Unemployment Compensation (UC) benefits are determined by each state, generally eligibility is based on individuals attaining qualifying wages and employment in covered work and it typically does not include independent contractors.
- **Family and Medical Leave.** The Family and Medical Leave Act (FMLA) entitles eligible employees to unpaid, job-protected leave for qualifying family and medical reasons, but independent contractors are not entitled to this provision.
- **Employer Payroll Taxes.** In a traditional employment relationship, an employer is responsible for paying the employer's share of Social Security and Medicare taxes while independent contractors have to pay these themselves.

While solid numbers on the gig economy are difficult to obtain, it is clear that the old New Deal economy and its safety net is crumbling for millions of US workers in a time of stagnant wages and increasing economic inequality¹⁴.

¹⁴ Source: http://www.huffingtonpost.com/steven-hill/how-big-is-the-gig-economy_b_8147740.html.

4. SKILLS RELATED POLICY INITIATIVES

KEY FINDINGS

Public policy has the ability to support the digitalisation of the labour market and promote the innovation climate in Silicon Valley. Many initiatives have been launched to respond to arising needs in US society due to the technological revolution. In this chapter, we highlight a number of measures that have been taken in three policy fields that are key in getting the workforce ready for the increasingly digitalised labour market, namely immigration, education and R&D.

The Obama Administration seeks to **reform the current immigration system** and the President has already taken steps to reduce the barriers for high-skilled graduates, entrepreneurs and immigrants to stay in the US and create value for the US economy as a response to the skills shortage that diverse sectors are confronted with. Besides investing in skills supply by attracting foreign workers, policy also targets the domestic education and training system. Measures are taken to **develop the digital and STEM skills** of individuals of all ages and different population groups. Furthermore, the 'Strategy for American Innovation' has been renewed, including financial support for key areas of innovation.

When developing the Silicon Valley Competitiveness and Innovation Project (SVCIP), Silicon Valley Leadership Group and Silicon Valley Community Foundation identified six levers for public policy to promote the region's innovation climate and competitiveness in the long run:

- immigration;
- education;
- housing;
- transportation;
- Research & Development (R&D);
- business costs.

In this chapter, we focus on public policy initiatives in those domains that are most pertinent to the US labour market in the context of digitalisation, i.e. immigration, education and R&D. We present some interesting US initiatives seeking to support the digitalisation of the economy, brought in by the White House in 2015 or 2016.

4.1. Efforts made to attract qualified workers through immigration

For centuries, immigration has been at the heart of US policy, among other things, to supply the labour market with qualified workers. Some plead for relaxing the current immigration system given the skills shortage that diverse sectors are confronted with and the valuable contribution of immigrations in developing innovative technologies and businesses like Google, eBay, Yahoo!, Sun Microsystems, and Intel. An important step was taken by means of the **Border Security, Economic Opportunity and Immigration Modernization Act** of 2013 (S.744). While maintaining the current cap of 140,000 permanent employment-based (EB) visas, the Act seeks to exempt STEM graduates from the cap if they obtain an advanced degree (at least a master's degree) and a job offer. Moreover, an additional 10,000 EB visas would be created for entrepreneurs and it has also

been proposed that the cap for temporary H-1B visas should be raised. While the Act passed the Senate in 2013¹⁵, the House of Representatives kept it from coming to a vote, so it has not become part of US law (yet). Still, it is important to note that President Obama does not want free-standing high-skill STEM immigration to happen unless it is tied to overall immigration reform, which is very unlikely to occur according to US experts.

Nonetheless, when taking office, President Obama committed to – as he put it – “fixing the broken immigration system” by taking executive actions and using his legal authority to introduce a number of changes into the US immigration system while awaiting the vote. According to the Whitehouse’s portal site on immigration, these changes comprise multiple aspects:

- reinforcing border security to reduce illegal crossings;
- reducing the barriers for high-skilled graduates, entrepreneurs and immigrants to stay in the US and create value for the US economy;
- taking action against undocumented immigrants and the employers knowingly hiring them.

With respect to the second item the Obama administration reorganised legal immigration as a way to boost the US economy. Making spouses of some high-skilled workers eligible for work had a substantial impact as it was to the advantage of 180,000 people in 2014, and another 55,000 people in each of the following years.

In addition to the President’s executive actions, two new bills were introduced in 2015 to reinforce the workforce with qualified workers who have the skills to work in the digitised economy and contribute to further technological innovations.

- the Startup Act (S.181)¹⁶
 - Status (February 2016): referred to the Committee on Finance
 - Focus: create supplementary paths to permanent employment-based visas for foreign STEM students who graduated in the US and for immigrant entrepreneurs to operate in the US economy and create jobs. The newly created STEM visa would relate to graduates with advanced degrees (from universities or colleges) in a STEM field and having a STEM-related profession (either as a teacher or a worker in the private, non-profit or public sector).
- the Immigration Innovation (“I-Squared”) Act of 2015 (S. 153)¹⁷
 - Status (February 2016): referred to the Committee on the Judiciary
 - Focus: increase higher-skilled immigration through reforms to the temporary visa program (H-1B), the employment-based permanent immigration program and student visas. STEM graduates from colleges or universities in the US would be exempted from the current cap on EB visas. Additionally, the bill would also become more flexible and respond to market demand, by being able to fluctuate within a margin of up to 20,000 visas (to be determined on a yearly basis). In order to increase mobility in the labour market and make H-1B workers less dependent on their employers sponsoring their visa, the bill proposes a 60-day period for finding new employment (and sponsorship) if workers quit or lose their job. Furthermore, it would enable spouses of workers with temporary visas to work.

¹⁵ <https://www.congress.gov/bill/113th-congress/senate-bill/744>.

¹⁶ <https://www.congress.gov/bill/114th-congress/senate-bill/181/all-info>.

¹⁷ <https://www.congress.gov/bill/114th-congress/senate-bill/153/all-info>.

4.2. Continuous investments in the educational system

Besides investing in skills supply by attracting foreign workers, policy also targets the US education and training system. Numerous initiatives are in place to develop the digital and STEM skills of individuals of all ages and in different population groups. We highlight initiatives, supported by federal funding, that the White House has brought in during 2015 and 2016.

The **TechHire Initiative**¹⁸ seeks to develop Americans' skills for accessing technology jobs since over 10% of job openings are in IT fields. It supports education and training practices in traditional education (e.g. in universities or community colleges), but also through free or discounted online courses provided by diverse suppliers and access to coding boot camps, with a focus on underserved populations like women and minorities. The main idea is that communities, cities, corporate and non-profit organisations share information, tools and resources to achieve the goal of improved access to decent technology jobs. An important aspect of the TechHire Initiative is the Department of Labor's effort to make \$100 million (financed by an H-1B user fee) available in grants by means of a competition. More specifically, grants are awarded to providers with innovative methods for developing the skills of low-skilled people facing additional barriers in the labour market, such as those with child care responsibilities.

Furthermore, by means of **IT Industry-Credentialing partnerships**, the Obama Administration has budgeted \$300 million in 2016 to financially support local employers in setting up partnerships to develop assessment tools for IT jobs and use them to certify a broad range of people as an alternative pathway into well-paid tech jobs.

In 2015 the White House announced **new STEM commitments** in the form of \$240 million private-sector commitments aimed at inspiring young people to progress in STEM fields and pursue STEM careers¹⁹. This follows the **Educate to Innovate** campaign, launched in 2009, which provides more than \$1 billion in federal funding and additional in-kind support to improve STEM education in primary, secondary and tertiary education. The overall objective is to improve the science and maths skills of American students in order to prepare them for future jobs. New commitments focus, among other things, on support for early career scientists, under-represented young people and STEM teachers, as well as the creation of new media to develop STEM skills and initiatives to reach more students with high quality education programmes.

On February 1, 2016 The Atlantic (Zinshteyn, 2016) published an article on the **computer-science-for-all** initiative pursued by the White House. The President will ask Congress to provide a new programme for states (\$4,000 million) and districts (\$100 million) to invest in the development of teachers and the procurement of teaching materials in schools as a way of giving all students the chance to get acquainted with computer science. The initiative will be included in the proposed budget for 2017, although US experts consider it unlikely that this initiative will be funded.

Such investments are needed, since, according to research by Infosys, less than half of young professionals in the US think that their formal education did not prepare them for what to expect from working life (Infosys, 2016). Accordingly, the eSkills Manifesto published by European Schoolnet and DIGITALEUROPE (2015) concludes that the US

¹⁸ <https://www.whitehouse.gov/the-press-office/2015/03/09/fact-sheet-president-obama-launches-new-techhire-initiative>.

¹⁹ <https://www.whitehouse.gov/the-press-office/2015/03/23/fact-sheet-president-obama-announces-over-240-million-new-stem-commitmen>.

educational system does not succeed in supplying enough skilled workers to meet market demand.

- For most students in primary and secondary schools it is not possible to follow rigorous courses in computer science as most US high schools focus on biology, chemistry, and physics (The Atlantic, 2016). Nonetheless, there are signs of improvement. For instance, the 2015 National Secondary School Computer Science Survey by the Computer Science Teachers Association (CSTA) shows that 69% of the respondents had registered more enrolments in computer science in the last three years. Furthermore, around 100 STEM high schools have been established, characterised by a STEM-based curriculum.
- At the tertiary level, the United States has many top-notch departments devoted to computer science, like Massachusetts Institute of Technology (MIT), Harvard, and Stanford. Yet, critics argue that the theoretical level outperforms the practical side (e.g. CNBC, 2014). Additionally, the eSkills Manifesto points out that universities do not offer more courses to meet increased market demand, for instance because of budgetary restrictions given the infrastructure IT requires and the rigidity of tenured faculty members.
- Nonetheless, at tertiary level, coding schools have arisen seeking to develop digital skills more quickly. Approximately 16,000 students graduated in 2015, i.e. twice the rate of 2014 and accounting for roughly one in three computer science graduates from US universities. In 2015, 12 such schools were located in San Francisco (compared to 9 in New York and 8 in Seattle). Furthermore, community colleges also play an important role in post-secondary education with some having a technological focus in their curricula tailored to the needs of the (local) labour market. Some colleges also engage in partnerships with employers to prepare students for future jobs.

4.3. Innovation policy supports cutting-edge technological companies

In 2015 the Obama Administration renewed the 'Strategy for American Innovation', introduced in 2009 and updated in 2011, which aimed to help the US remain the leading economy when it comes to innovation. The budget for 2016 includes financial support for key areas of innovation, as identified in the Strategy. It demonstrates a commitment to continuing to invest in R&D as a way of fostering sustainable growth. Secondly, it reflects the decision to invest in strategically important projects, like unconventional vehicles. The third key component is the intention to increase innovation within the federal government and so support the private sector and society as a whole in their search for innovation. For these purposes, a budget of \$146,000 million was requested for R&D by the Obama Administration in 2016.

Besides funding research at universities and federal laboratories, the White House²⁰ also stresses the need to invest in "new areas of strategic opportunities", highlighting the following nine:

- Advanced Manufacturing
- Precision Medicine
- Brain (Brain Research through Advancing Innovative Neurotechnologies) initiative
- Advanced Vehicles
- Smart cities

²⁰ <https://www.whitehouse.gov/the-press-office/2015/10/21/fact-sheet-white-house-releases-new-strategy-american-innovation>.

- Clean Energy and Energy Efficient Technologies
- Educational Technology
- Space
- New Frontiers in Computing

Federal investments in these (and similar) fields have been crucial to the success of Silicon Valley. Stephen Ezell, Senior Analyst of the Information Technology and Innovation Foundation (ITIF), presented some examples on November 30, 2014. He pointed out that federal R&D funding was the basis of the success of Google as the National Science Foundation (NSF) gave part of a \$4.5 million digital libraries research grant to two graduates searching for a way to improve sorting and finding online information. Besides Google, other companies launched by federally funded university research include Cisco Systems, SAS, Genentech, Sun Microsystems and iRobot.

5. FOCUS ON SILICON VALLEY

KEY FINDINGS

Silicon Valley is an exceptional place for start-ups, innovators and STEM-related jobs. Its start-up ecosystem is 4.5 times bigger than London's and the Silicon Valley region has world-leading access to venture capital. This has strengthened the local economy and has led to a **concentration of high-value companies**.

Employment in Silicon Valley is at its highest rate since 2000, with a steady increase of around 4% in recent years. The only sector with a negative employment evolution is the manufacturing sector. Just over a quarter (26%) of Silicon Valley's labour force is employed in innovation industries.

When we look at the impact of digitalisation on jobs and working conditions in Silicon Valley, it seems that Silicon Valley is a hotspot for **tech- and STEM-related jobs**, with the highest per capita concentration of people employed in these occupations. This digitalised economy is characterised by a very strong process of creative destruction, with the opening of around 3,000 innovative companies and the closing or moving out of 2,500 in just one year.

There is a strong focus on **research and development** in Silicon Valley, with 5 renowned universities, 5 national laboratories and one of the highest federal funding rates for research in the United States.

Silicon Valley and the broader Bay Area are **strongly intertwined with the European economy**. Europe is the largest global investor and a strong innovation partner. European firms account for one third of all foreign companies and there are over 170 000 European-born residents in the Bay Area.

The (corporate) **culture** in Silicon Valley is highly specific, with a strong entrepreneurial spirit and a focus on innovation and collaboration.

Recent data also shows that Silicon Valley is characterised by **increasing wage inequality**. Even if income inequality in the US has been increasing for several decades, income inequality in California and the San Francisco Bay Area has increased at a more rapid rate than the US as a whole.

Although Silicon Valley is well-known for innovation and meritocracy, it remains a **white and male-dominated landscape**. Only 3% to 4% of tech workers are either **Black or Latino**, while they represent 41% of all private security guards in Silicon Valley, 72% of all janitorial and building cleaning workers, and 76% of all grounds maintenance workers.

Concerning **gender equality**, data shows that women are significantly underrepresented in tech jobs in Silicon Valley. Only 15% of venture capital companies have even a single woman serving in an executive role; fewer than 3% have a female CEO; and just 6% of venture capital firm partners are women. Women are not only underrepresented in tech jobs in Silicon Valley but also earn **52-61% less** than men with the same level of educational attainment. Moreover, a survey also shows that for women in tech and venture capital firms **gender discrimination** is common in Silicon Valley.

The US West Coast economy and more specifically Silicon Valley could be considered as a 'laboratory for the future', both in terms of the enabling software it generates and the impact of its own business models on all sectors of the economy. This chapter therefore focusses on the actual situation in Silicon Valley, in terms of the economy, job dynamics, research, culture, inequality and discrimination issues.

5.1. The economy of Silicon Valley

With a population of close to three million people, Silicon Valley has less than 1% of the total US population or roughly the same number of inhabitants as Lithuania. However, if we were to consider it as a country, it would rank among the world's 50 largest economies (Kazaks & Kutcher, 2015). Compared to other metropolitan regions, Silicon Valley has the third largest per-capita gross domestic product, after Zurich and Oslo (The Brookings Institution, 2014). Silicon Valley's start-up ecosystem is three times bigger than New York City's, four and a half times bigger than London's and twelve and a half times bigger than Berlin's (Ezell, 2014). Companies in Silicon Valley also have world-leading access to venture capital; 40% of US venture capital is invested in Silicon Valley and the Bay Area (Silicon Valley Institute for Regional Studies, 2015).

Another stunning indicator of the strength of the Silicon Valley economy is the number of 'unicorns': 32 out of 50 of these start-ups with a valuation of a least 1,000 million dollars are located in Silicon Valley (Kazaks & Kutcher, 2015). Six of the top ten technology companies globally, with a combined market cap of \$1.8 trillion, are located within a 10 sq. mile radius (Ezell, 2014). The value of all of the existing unicorns in Europe combined is nearly half of the market capitalisation of just one Silicon Valley company, Facebook (Breene, 2015).

However, GP.Bullhound believes that European based tech start-ups are more solid than their US competitors. The bar for European-based start-ups to raise capital is higher because of a more disciplined investment strategy. Recent numbers on the initial public offering (IPO) of tech start-ups in Europe support this claim. One month after their IPO, the weighted average of European stocks gained 20%, outperforming the 6.8% increase for US stocks (Bloomberg, 2015).

Box 4 : Europe in Silicon Valley

Europe is by far the **largest global investor** in the Bay Area. 4,005 million dollars or 49% of global investment in the Bay Area came from Europe in 2012. This can partially be explained by Europe's highly developed financial services sectors and the long-term link with the Bay Area. The investments are not one-sided: in 2012, the Bay Area invested 3,300 million dollars or 56% of the region's foreign investments in Europe.

European **firms**, with more than 1,000 affiliates, account for one third of all foreign companies operating in the region.

There are roughly **170,000 European-born residents** in the Bay Area, and they account for 9% of all foreign-born STEM workers. These residents have a well-above average educational level, with 26% having attained a master's degree or higher.

Europe is the Bay Area's most significant global **innovation partner**. The collaboration with Europeans in patent registration, particularly in information and communications technology, is growing and accounts for 39% of all Bay Area patents with foreign partners since 1999.

Europe is **the third largest trading partner** for the Bay Area, making up roughly 9,000 million dollars or 18% of exports in 2012. Europe is often the first overseas market for US companies, because of accessibility, scale and legal transparency.

30 European countries have diplomatic offices in the Bay Area, which is the **largest European diplomatic presence in the US after Washington DC and New York City**. The private sector is also strongly represented, with 14 bi-national business organisations to support trade between Europe and the Bay Area.

Source: Bay Area Council, 2014.

5.2. Job dynamics in Silicon Valley

The economic crisis has had a negative effect on employment in Silicon Valley, but the total number of jobs recovered and is at the highest point since 2000. With a growth rate of over 4% from mid-2013 to mid-2014, the number of jobs increased by 58,000 to a total of nearly 1.5 million (Silicon Valley Institute for Regional Studies, 2015).

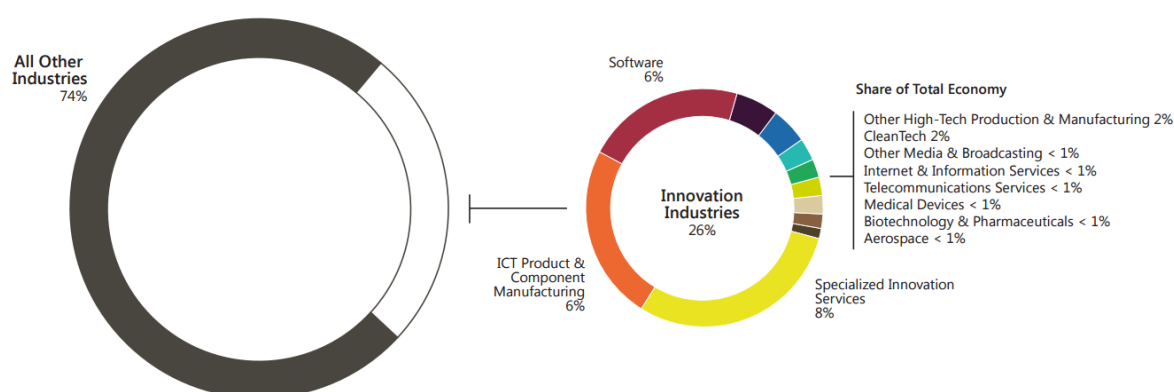
Job growth in Silicon Valley is occurring across nearly all major areas of economic activity:

- Jobs in community infrastructure and services grew by 40,096 (+5.7% between Q2 2013 and Q2 2014).
- Innovation and information products and services by 18,445 (+5.3%).
- Business Infrastructure & Services by 12,294 (+5.3%).

Despite this overall positive evolution, 1.1% of Silicon Valley's manufacturing jobs were lost.

Silicon Valley is known for its large share of innovation industries. 26% of its labour force is employed in companies that research, develop and/or scale new technologies, uses and processes, or support the development of start-up companies (Henton et al., 2015). Figure 11 shows more details on the different sectors of employment.

Figure 11 : Employment in innovation industries



Source: Henton et al., 2015.

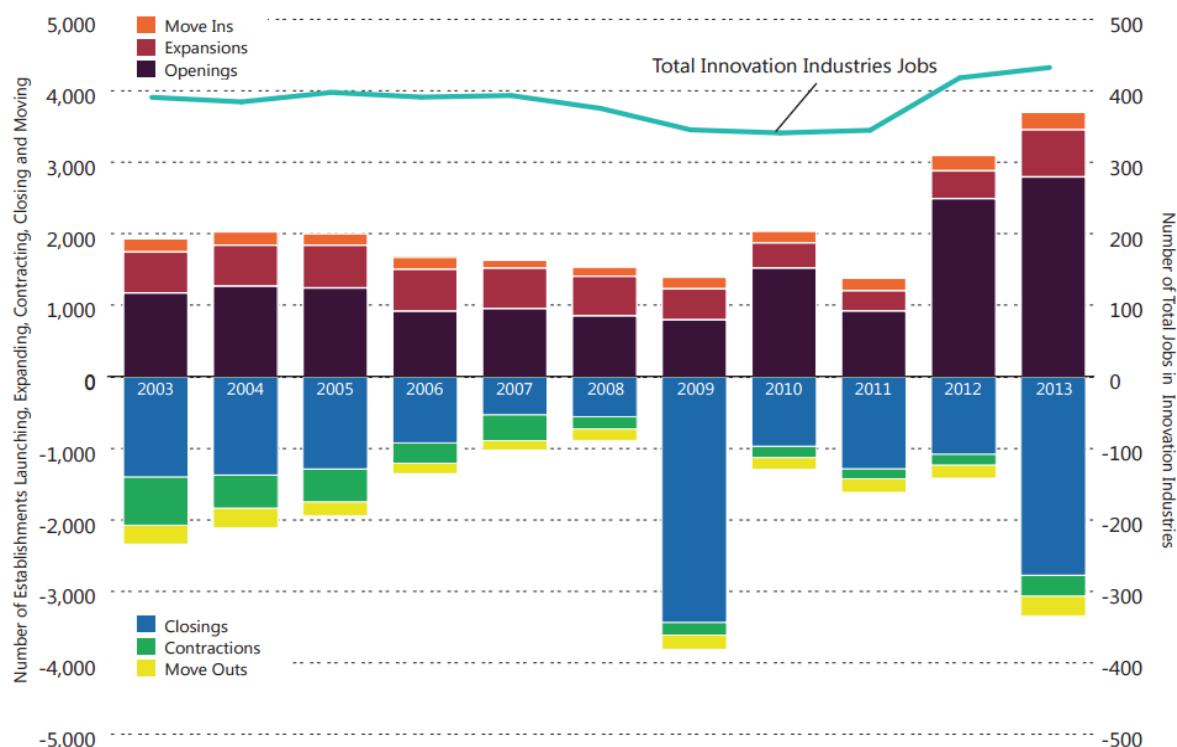
Although the share of 26% is well above the US average, it also implies that the majority of the workforce is not employed in innovation industries. The middle-wage and middle-skill jobs are under pressure and have barely recovered from the economic crisis (Silicon Valley Institute for Regional Studies, 2015).

The proportion of tech and STEM workers keeps growing. Since 2004, there has been employment growth of 70.2% in the tech sector and an increase of 25.8% in STEM employment (Kotkin, 2015). In absolute numbers there are more tech and STEM employees in New York City, Washington DC and Los Angeles. Silicon Valley however has the highest per capita concentration of people in engineering occupations, with almost five times the national average. The share of STEM workers is three times the proportion of the US average.

These high and increasing numbers for employment in tech and STEM occupations hide an important aspect of the Silicon Valley labour market, namely the process of creative destruction (see figure below). The innovation industries in the Bay Area are highly

dynamic. The area has the highest rates of expanding, contracting, opening, closing and moving businesses of the innovation regions (Henton et al. 2015).

Figure 12 : Creative destruction in Silicon Valley



Source: Henton et al., 2015.

Around 3,000 companies in innovative sectors opened or moved into the region in 2013, while 2,500 moved out or closed. This has clear implications for the employers of these firms. 38% of business establishments within the innovation industries hired or fired workers in 2013. While this continuous creation and destruction of jobs can be disruptive, in general it is considered as an enrichment of networks and expertise in Silicon Valley.

5.3. Research in Silicon Valley

Silicon Valley can be described as the world's greatest assembly of scientific research capacity. With the universities of Berkeley, Stanford, Davis, Santa Cruz and San Francisco, the area has five world-class research universities. These universities are complemented with multiple leading research institutions and corporate research labs from Google and HP to Xerox, IBM and so on.

The Bay Area is also the home of five US national laboratories, including a NASA lab and the Stanford Linear Accelerator. Santa Clara county, one of the major counties of Silicon Valley, received more federal funding for research and development than any other US County from 1950 through to 1995 (Ezell, 2014).

These conditions make Silicon Valley an inviting location for high-skilled talent from all over the world. The share of Bachelors, Masters and PhD holders is twice the national average. More than half of the start-ups in Silicon Valley have a least one foreign-born founder.

5.4. The culture of Silicon Valley

"Silicon Valley is like Tasmania or Madagascar. It's developed different life forms than anywhere else," claims Steven John, strategic chief information officer of Workday. The

region has a distinctively entrepreneurial, innovative and collaborative culture (Ezell, 2014).

Accenture (2013) described five seemingly contradictory characteristics of the workplace culture in Silicon Valley, based on an extensive series of interviews with a variety of actors in the area and a broad survey²¹. This culture has helped in shaping some of the massive innovations created in the region:

- **Laid back, yet driven for speed:** the culture in Silicon Valley is relaxed and informal, but people will work very hard to achieve their goals. Workers in Silicon Valley are twice as likely to agree with the statement that 'done is better than perfect' and that 'the company they work for makes faster decisions than other companies'.
- **Committed, yet independent:** employees are actively involved in the company, but they remain free agents who keep their options open. A larger share of workers in Silicon Valley agree that their professional allegiance is to their company compared to IT professionals across the United States. At the same time, 40% of Silicon Valley respondents would quit their job immediately if they were unhappy with their company, almost twice as many as non-Silicon Valley workers.
- **Competitive, yet cooperative:** the pressure is high and there is open competition between workers (see also box below), but they actively work together to achieve a common goal. Compared to non-Silicon Valley professionals, Silicon Valley workers were more likely to choose their jobs based on the people they will be working with.
- **Pragmatic, yet optimistic:** people in Silicon Valley accept failure, but firmly believe that any problem can be solved. This mind-set is illustrated by the venture capital community, who often fund entrepreneurs with a history of failed businesses.
- **Extrinsically motivated, yet intrinsically fulfilled:** money and wages are an important driver in Silicon Valley, but the ultimate goal of workers is recognition for their innovation and creativity. Compared to non-Silicon Valley workers, a higher percentage of Silicon Valley professionals (64.4%) claim that money is very important to them. However, half of them would do what they do for less money.

These characteristics are also discussed in detail in hundreds of articles, blogs, etc. They confirm the image of the high work intensity in Silicon Valley. Employees work 70 hours a week, are expected to respond to emails in the middle of the night, are in the office while they are sick, etc. (Gaudin, 2015) Working marathon hours is also part of Silicon Valley's DNA. However, employees consider that this is the price they have to pay to work for some of the most successful and innovative tech companies in the world.

Work culture at tech companies hit the headlines during the summer 2015 when the New York Times ran a story on Amazon. The story talked about employees crying at their desks, working 80-plus hour weeks and being expected to work when they were not well or after a family tragedy.

However, tech companies are also known for giving their employees perks that people working in other industries only dream of. For example, Google has world-class chefs cooking free food for its employees, while also setting up nap pods, meditation classes and sandy volleyball courts. Netflix recently made global headlines for offering mothers and

²¹ Accenture first interviewed economists, academics, HR executives, executive recruiters, entrepreneurs, venture capitalists, CIOs, and high-tech executives and professionals in Silicon Valley. Secondly, they conducted a focus group with Silicon Valley entrepreneurs. Lastly, a survey with 600 full-time IT professionals was conducted. Two groups were compared, with half of them based in Silicon Valley and the other half located all across the US.

fathers unlimited time off for up to a year after the birth or adoption of a child. All those perks that started in the tech industry come with the job because the job is so demanding.

While this culture is typical for the innovation industry in Silicon Valley, it is very doubtful if it reflects the broad culture in the area. The majority of workers in the Bay Area are not employed in these sectors.

5.5. Rising inequality in Silicon Valley

Jobs in Silicon Valley are characterised by **high wages**. For example, software application developers earn on average \$96,260 a year in the US. But in metropolitan San Jose they earn \$131,270, the highest wage in the country. Similar patterns are observable for other occupations even within the same job title²².

Data for 2015 from the Bureau of Labor Statistics confirmed that Silicon Valley employees are among the highest paid in the US, with the average worker in San Mateo County earning \$3,240 per week - more than three times the national average, and \$1,100 more per week than the average employee in Manhattan. By comparison, the average salary for all professions in the Bay Area is \$66,070, according to the Bureau of Labor Statistics. These wages are a consequence of bidding wars between companies like Google, Facebook, and Twitter²³.

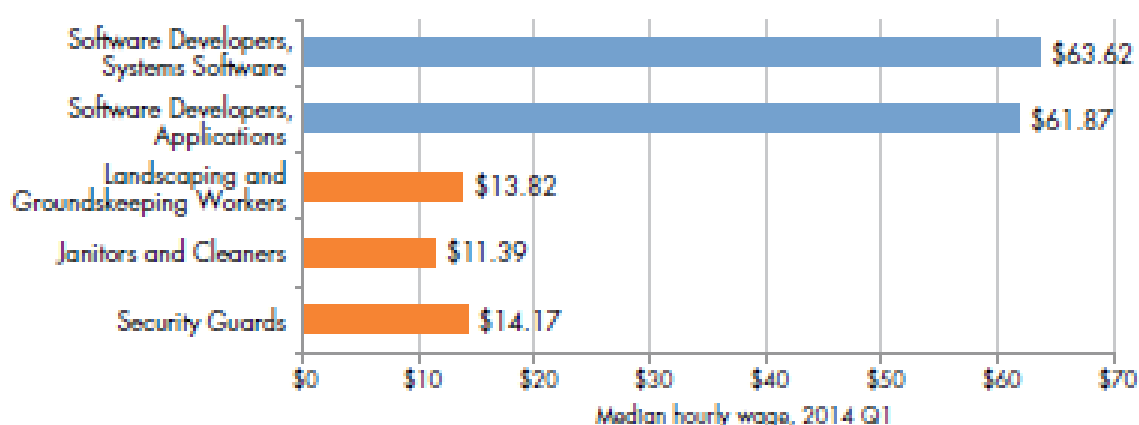
However, the downside of these high wages is that the **cost of living** in Silicon Valley exceeds other metropolitan areas - including even New York City - by 62% on average. A driving factor is housing, which at about \$775,000 for a single-family home, costs nearly three times as much as the national average. However, for highly compensated workers it remains attractive to live and work in Silicon Valley²⁴.

The attention focused on highly compensated workers obscures the trend of **widening inequality** in Silicon Valley. As mentioned in the figure below, although they go to work each day on the same campus as the engineers and coders, the wages of contracted workers are worlds apart. In the two largest tech occupations in Santa Clara County - systems software developers and applications software developers - the respective hourly median wages are \$63.62 and \$61.87. In sharp contrast, the median wages for the three largest categories of contracted workers - landscaping workers, janitors, and security guards - are \$13.82, \$11.39, and \$14.17. Contracted workers also do not have access to the benefits afforded to tech companies' core workforce (e.g. very basic benefit of earned sick days).

²² <http://www.brookings.edu/blogs/the-avenue/posts/2014/08/06-the-silicon-valley-wage-premium-rothwell..>

²³ <http://www.infoworld.com/article/2612795/it-jobs/silicon-valley--top-salaries-for-many--greater-inequality-for-all.html>.

²⁴ <http://jobs.aol.com/articles/2011/08/02/high-cost-of-living-erodes-silicon-valleys-generous-paychecks/>.

Figure 13 : Median Wages for Selected Occupations, Santa Clara County, 2014

Source: Working partnerships USA (2014), "Tech's Diversity Problem More Than Meets the Eye".

Moreover, since housing costs are rising rapidly along with wages — a one bedroom San Mateo County apartment now rents for more than \$2,050 per month. A janitor working full-time would have to use his or her entire monthly income plus working overtime just to pay the rent on an average apartment in Santa Clara County.

This **growing inequality** in Silicon Valley is confirmed by several sources. A recent study by the Silicon Valley Institute For Regional Studies showed that although income inequality in the United States has been increasing for several decades, income inequality in California and the San Francisco Bay Area has increased at a more rapid rate than the US as a whole.

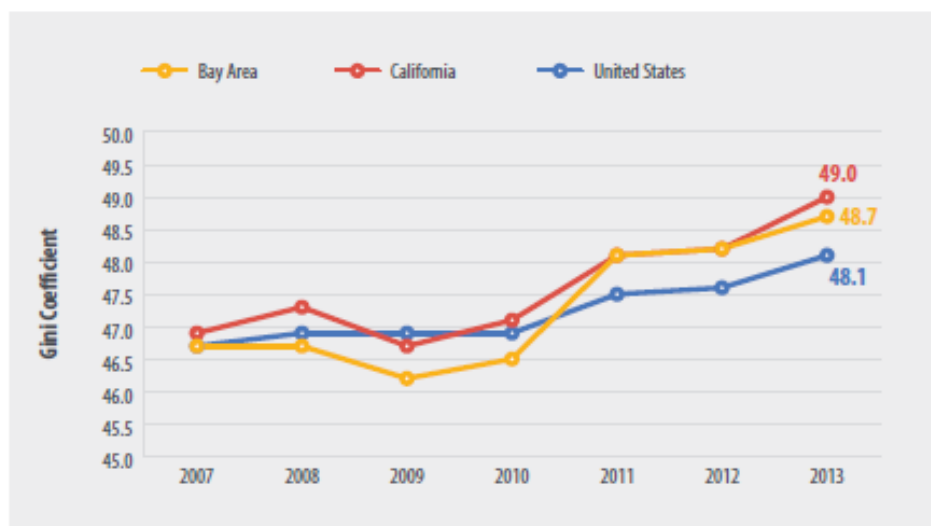
The higher inequality and incomes in Silicon Valley are confirmed by the table below that provides data on the Gini Coefficient (the ratio of incomes among the richest to the incomes of the poorest households) and the median household income in the United States, California, and the Bay Area.

Table 1 : Household Income Inequality in the Bay Area, California and the United States, 2013

Region	Gini Coefficient	Median Household Income
Bay Area	48.7	\$76,216
California	49.0	\$60,190
United States	48.1	\$52,250

Source: Silicon Valley Institute For Regional Studies (2015), "Income inequality in the San Francisco bay area".

Finally, the more rapid increase in wage inequalities in Silicon Valley is confirmed by the figure below that provides data on the evolution of the Gini Coefficient between 2007 and 2013 in the Bay Area, California and the United States.

Figure 14 : The Gini Coefficient in the Bay Area, California and the US, 2007-2013

Source: Silicon Valley Institute For Regional Studies (2015), "Income inequality in the San Francisco bay area".

5.6. Discrimination issues in Silicon Valley

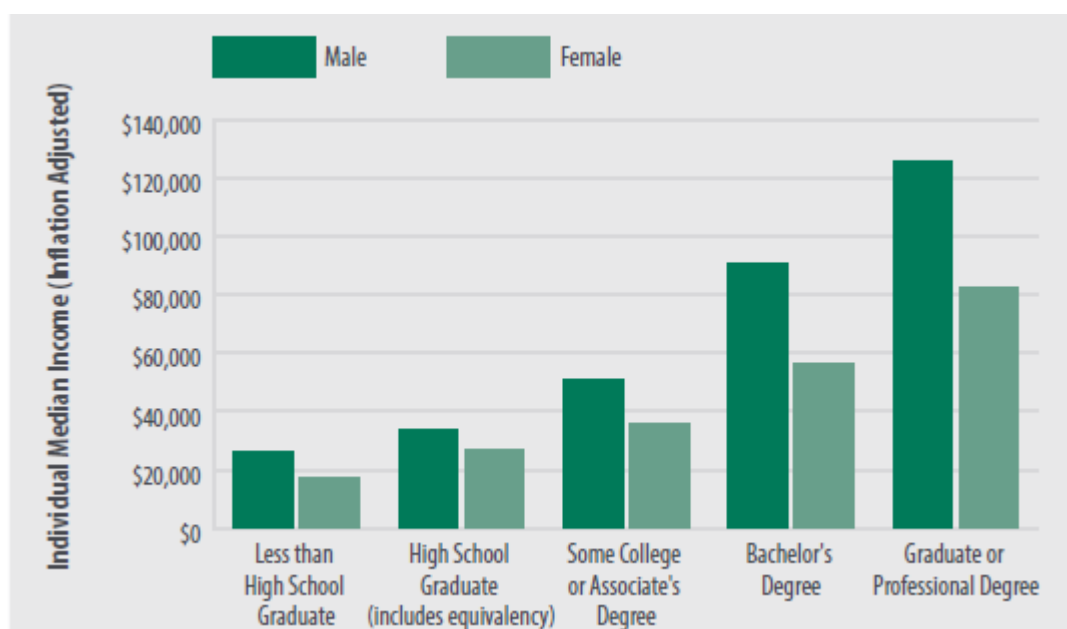
According to different sources, the **lack of diversity** in Silicon Valley's highly-paid workforce is striking. Under pressure from the media, Silicon Valley's largest tech firms (Facebook, Twitter, LinkedIn, Yahoo, Google and eBay) published data on the diversity of their workforce. This data shows that the workforce of these big tech companies is far behind the curve when it comes to **racial and gender equality**. Only 3% to 4% tech workers are either Black or Latino, although they represent 28% of the entire workforce in Santa Clara County.

However, it seems that tech companies employ the services of an army of Latino, Black, and immigrant workers: *"those who clean, guard, maintain, and cook on tech campuses every day, often for poverty-level wages"* (Silicon Valley Institute For Regional Studies, 2015). These contracted service workers are not counted in tech companies' workforces and constitute the Silicon Valley tech industry's **"invisible workforce"**. While Blacks and Latinos make up only 3% to 4% of Silicon Valley's core tech workforce, they are 41% of all private security guards in Silicon Valley, 72% of all janitorial and building cleaning workers, and 76% of all grounds maintenance workers. These "invisible" workers do not share the success of the industry and their high wages.

Concerning **gender equality**, data shows that women are significantly underrepresented in tech jobs in Silicon Valley relative to their percentage of the national workforce. Although tech employment has grown fast since 2003, the presence of women on engineering teams has remained flat (around 13%)²⁵. A study by Brush (2014) also shows that only 15% of venture capital companies have even a single woman serving in an executive role; fewer than 3% have a female CEO; and just 6% of venture capital firm partners are women.

Women are not only underrepresented in tech jobs in Silicon Valley but also earn less. As shown in the figure below, men in Silicon Valley with a Bachelor's, Graduate or Professional Degree earn **52-61% more** than women with the same level of educational attainment.

²⁵ <http://www.motherjones.com/politics/2015/05/silicon-valley-gender-sexism-women-engineers-tracy-chou>.

Figure 15 : Income in Silicon Valley by gender and educational level

Source: Silicon Valley Institute For Regional Studies (2015), "Silicon Valley Index 2015".

Moreover, as mentioned in the box below, a survey called "The Elephant in the Valley" shows that for women in tech and venture capital **gender discrimination** is common.

Box 5 : Case study: Results of the survey "The Elephant in the Valley"

In this survey, 220 women working in tech functions in Silicon Valley were interviewed on their work experience in Silicon Valley. The results of this survey show that:

- 60% of the women working in Silicon Valley experience unwanted **sexual advances**. About two-thirds of them say that these advances were from their superior.
- 75% of them were asked about their **family life**, marital status and children in interviews.
- 52% of those that took **maternity leave** cut it short so that it would not hurt their career.
- About 47% of women had been asked to do **lower-level tasks**, like taking notes or ordering food, that were not expected of their male colleagues.
- Two-thirds of the women surveyed felt **excluded from networking opportunities**, including lunch meetings and on the golf course, because they were women.

Source : <http://www.theguardian.com/technology/2016/jan/12/silicon-valley-women-harassment-gender-discrimination>

Even though Silicon Valley is well-known for innovation and meritocracy, it remains a white and male-dominated landscape. Most of the companies in Silicon Valley publicly acknowledged that the numbers reveal ample room for improvement and many of them committed to increasing the number of women and minorities in the workplace.

REFERENCES

- Autor, D. (2010), 'The polarization of job opportunities in the US labor market: Implications for employment and earnings', Center for American Progress and The Hamilton Project.
- Bay Area Council (2014), Europe and the Bay Area: Investing in Each Other.
- Berger, T., & Frey, C. B. (2015), Industrial Renewal in the 21st Century: Evidence from US Cities. *Regional Studies*, 1-10.
- Bracken, P (2015), How Has the Pentagon Shaped Innovation?, <http://insights.som.yale.edu/insights/how-has-pentagon-shaped-innovation>.
- Breene, K. (2015), Can Europe ever build its own Silicon Valley? Silicon Valley Institute for Regional Studies (2015), 2015 Silicon Valley Index.
- Bruegel (2014), The computerisation of European jobs.
- Brush, C., Greene, P., Balachandra, L. and Davis, A. Arthur (2014), 'Diana Report Women Entrepreneurs 2014: Bridging the Gender Gap in Venture Capital'
- Bureau of Labor Statistics (2014), Employment projections 2014-2024.
- Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2016-17 Edition, Military Careers,
- Capgemini Consulting (2013), The Digital Talent Gap. Developing Skills for Today's Digital Organizations.
- Carnevale, A.P, Smith, N., and Strohl, J. (2014), Recovery: job growth and education requirements through 2020. Georgetown University.
- Cedefop (2015), Europe's uneven return to job growth.
- Center for American Progress (2015), Report of the Commission on Inclusive Prosperity.
- Congressional Research Service, 2016, What Does the Gig Economy Mean for Workers?
- Davis, J. (2015), Capital markets and job creation in the 21st century, Brookings Institute.
- DLA Piper and PitchBook (2014), Technology Leaders Forecast Survey. 2014 Global Technology Leaders Summit October 7, 2014.
- Dokko, J., Mumford, M. and Schanzenbach W. (2015), "Workers and the Online Gig Economy A Hamilton Project Framing Paper"
- European Schoolnet and DIGITALEUROPE (2015), The e-Skills Manifesto. Brussels: European Schoolnet.
- Ezel, S. (2014), How the Silicon Valley innovation ecosystem creates success.
- Fenwick (2014), Gender Diversity in Silicon Valley: A Comparison of Silicon Valley Public Companies and Large Public Companies
- Freelancers Union & Elance-oDesk, (2015), Freelancing in America: A National Survey of the New Workforce.
- Frey, C. B., & Osborne, M. (2013), The future of employment. How Susceptible Are Jobs to Computerisation.

- Goodman, M., Finnegan, R., Mohadjer, L., Krenzke, T., and Hogan, J. (2013), Literacy, Numeracy, and Problem Solving in Technology-Rich Environments Among US Adults: Results from the Program for the International Assessment of Adult Competencies 2012: First Look (NCES 2014-008). US Department of Education. Washington, DC: National Center for Education Statistics. Retrieved [date] from <http://nces.ed.gov/pubsearch>.
- Hall, J. V., & Krueger, A. B. (2015), An analysis of the labor market for Uber's driver-partners in the United States. Princeton University Industrial Relations Section Working Paper, 587.
- Henton, D., Kaiser, J., Held, K. (2015), Silicon Valley Competitiveness and Innovation Project – 2015, a Dashboard and Policy Scorecard for a Shared Agenda of Prosperity and Opportunity.
- http://www.itif.org/files/Education_ITIF.pdf.
- IDEA Consult (2016), Employment and Skills Aspects of the Digital Single Market Strategy.
- Infosys (2016), Amplifying human potential: Education and skills for the fourth industrial revolution. Innovation in the United States. Information Technology & Innovation Foundation, February.
- International Labour Organization (ILO) (2015), 'World Employment Social Outlook. Trends 2015', International Labour Office – Geneva.
- Kazaks, A., Kutcher, E., Uhl, M. (2015), How should you tap into Silicon Valley? The Brookings Institution (2014), Global Metromonitor: an uncertain recovery.
- Kolderie, T. and McDonald, T. (2009). "How Information Technology Can Enable 21st Century Schools". Information Technology and Innovation Foundation.
- Landivar, L.C. (2013), "The Relationship Between Science and Engineering Education and Employment in STEM Occupations," American Community Survey Reports, ACS-23, US Census Bureau, Washington, DC.
- McKinsey & Company, (2015), Connecting Talent with Opportunity in the Digital Age.
- McKinsey Global Institute (2011), An economy that works: Job creation and America's future.
- McKinsey Global Institute (2012), Help wanted: The future of work in advanced economies Discussion paper.
- McKinsey Global Institute (2015). Digital America: A Tale of the Haves and Have-Mores.
- Nager, A., Hart, D., Ezell, S. & Atkinson, R.D. (2016). The Demographics of innovation in the united states.
- Nager, A.B., & Atkinson, R.D. (2015), Debunking the Top Ten Arguments Against High-Skilled Immigration. Information Technology & Information Foundation, April.
- Needham, C. (2013), Social welfare protection: the EU, USA and China.
- North, D. (2013). America has more trained STEM graduates than STEM job openings so why import foreign high-tech workers? Center for Immigration Studies (CIS), May
- OECD (2015), 'OECD Skills Outlook 2015: Youth, Skills and Employability', OECD Publishing. <http://dx.doi.org/10.1787/9789264234178-en>

- Routon, P. W. (2014). The effect of 21st century military service on civilian labor and educational outcomes. *Journal of Labor Research*, 35(1), 15-38.
- Salzman, H., Kuehn, D., and Lowell, B. L. (2013). Guestworkers in the high-skill US labor market. An analysis of supply, employment, and wage trends. EPI Briefing Paper #359, Economic Policy Institute.
- Silicon Valley Institute For Regional Studies (2015), "Income inequality in the San Francisco bay area".
- Silicon Valley Institute For Regional Studies (2015), "Silicon Valley Index 2015".
- Sproul, D., Knowles-cutler A., and Gentle, C. (2014), 'Agile town: the relentless march of technology and London's response'.
- US Department of Commerce (2014), STEM: Good Jobs Now and for the Future.
- Working partnerships USA (2014), "Tech's Diversity Problem More Than Meets the Eye"
- World Economic Forum (2016), Digital Media and Society Implications in a Hyperconnected Era.
- World Economic Forum (2016), Future of jobs.

Websites:

- <http://svcip.com/>.
- <http://www.bls.gov/>.
- <https://www.whitehouse.gov/issues/immigration/immigration-action#>
- <https://www.whitehouse.gov/the-press-office/2015/03/09/fact-sheet-president-obama-launches-new-techhire-initiative>.
- <https://www.whitehouse.gov/the-press-office/2015/03/23/fact-sheet-president-obama-announces-over-240-million-new-stem-commitment>.
- <https://www.whitehouse.gov/the-press-office/2015/10/21/fact-sheet-white-house-releases-new-strategy-american-innovation>.
- <http://techcrunch.com/2013/05/05/there-is-in-fact-a-tech-talent-shortage-and-there-always-will-be/>.
- <http://www.changetheequation.org/>.
- <http://www.brookings.edu/blogs/the-avenue/posts/2014/08/06-the-silicon-valley-wage-premium-rothwell>.
- <http://www.infoworld.com/article/2612795/it-jobs/silicon-valley--top-salaries-for-many--greater-inequality-for-all.html>.
- <http://www.computerworld.com/article/2972723/it-careers/silicon-valleys-pressure-cooker-thrive-or-get-out.html>.
- <http://www.huffingtonpost.com/steven-hill/how-big-is-the-gig-econom b 8147740.html>.
- <http://www.theguardian.com/technology/2016/jan/12/silicon-valley-women-harassment-gender-discrimination>.
- <http://jobs.aol.com/articles/2011/08/02/high-cost-of-living-erodes-silicon-valleys-generous-paychecks/>.

Newspapers:

- Atkinson, R. (2015). COMMENTARY: Silicon Valley loses guest worker lottery: <http://www.courierpostonline.com/story/opinion/columnists/2015/05/10/commentary-silicon-valley-loses-guest-worker-lottery/26978117/>.
- Bessen, J. (2014): Employers Aren't Just Whining – the "Skills Gap" Is Real.
- Dembosky, A. (2013), Silicon Valley rooted in backing from US military.
- Hayman, J. (2015). 4 key factors contributing to the IT skills gap.
- Hira, R., Stephan, P., Salzman, H., Teitelbaum, M., and Matloff, N. (2014), Bill Gates' tech worker fantasy: Column. Silicon Valley has created an imaginary staffing shortage:
- <http://money.cnn.com/2014/09/25/smallbusiness/stem-facts/>.
- <http://www.bizjournals.com/bizjournals/how-to/technology/2015/07/4-key-factors-contributing-to-the-it-skills-gap.html?page=all>.
- <http://www.ft.com/intl/cms/s/0/8c0152d2-d0f2-11e2-be7b-00144feab7de.html#axzz42EMJPP0y>.
- <http://www.usatoday.com/story/opinion/2014/07/27/bill-gates-tech-worker-wages-reforms-employment-column/13243305/>
- <https://hbr.org/2014/08/employers-arent-just-whining-the-skills-gap-is-real/>.
- Kotkin, J. (2015), cities creating the most tech jobs: <http://www.forbes.com/sites/joelkotkin/2015/04/14/cities-creating-the-most-tech-jobs-2015/#14ab69904d2f>.
- O'Brien, S.A. (2014). 6 things you need to know about STEM:
- Russo, C., (2015), Europe Tech IPOs Are Beating Silicon Valley Victims of Own Hype: <http://www.bloomberg.com/news/articles/2015-11-30/europe-tech-ipos-are-beating-silicon-valley-victims-of-own-hype>.
- Soper, T. (2015), Huge growth: Amazon reaches 222,400 employees, hires 39,000 in last quarter alone: <http://www.geekwire.com/2015/huge-growth-amazon-reaches-222400-employees-hires-39000-in-last-quarter-alone/>.
- Zinshteyn, M. (2016). The Reality of Coding Classes: <http://www.theatlantic.com/education/archive/2016/02/obamas-push-for-computer-science-education/459276/>.

ANNEX

Figure 16 : The number of new jobs by occupation (2014-2024)

OCCUPATION	NUMBER OF NEW JOBS (PROJECTED), 2014-24	2014 MEDIAN PAY
Personal care aides	458,100	\$20,440 per year
Registered nurses	439,300	\$66,640 per year
Home health aides	348,400	\$21,380 per year
Combined food preparation and serving workers, including fast food	343,500	\$18,410 per year
Retail salespersons	314,200	\$21,390 per year
Nursing assistants	262,000	\$25,100 per year
Customer service representatives	252,900	\$31,200 per year
Cooks, restaurant	158,900	\$22,490 per year
General and operations managers	151,100	\$97,270 per year
Construction laborers	147,400	\$31,090 per year
Accountants and auditors	142,400	\$65,940 per year
Medical assistants	138,900	\$29,960 per year
Janitors and cleaners, except maids and housekeeping cleaners	136,300	\$22,840 per year
Software developers, applications	135,300	\$95,510 per year
Laborers and freight, stock, and material movers, hand	125,100	\$24,430 per year
First-line supervisors of office and administrative support workers	121,200	\$50,780 per year
Computer systems analysts	118,600	\$82,710 per year
Licensed practical and licensed vocational nurses	117,300	\$42,490 per year
Maids and housekeeping cleaners	111,700	\$20,120 per year
Medical secretaries	108,200	\$32,240 per year

Source: Bureau of Labor Statistics (2014), Employment projections 2014-2024.

Figure 17 : Employment outlook by main industries (2015-2020)**Main Industries**

Industry	Employment outlook, 2015–2020	CURRENT		2020	
		Local share of recruitment, specialists	Ease of recruitment, overall	Local share of recruitment, specialists	Ease of recruitment, overall
Professional Services	growth 1.77%	51–75%	neutral	26–50%	harder
Financial Services & Investors	growth 2.76%	51–75%	hard	26–50%	neutral
Information and Communication Technology	stable 0.43%	26–50%	neutral	26–50%	neutral
Basic and Infrastructure	stable 0.21%	51–75%	hard	26–50%	harder
Healthcare	decline –2.14%	51–75%	hard	26–50%	harder
Energy	decline –2.35%	26–50%	hard	26–50%	neutral

Source: World Economic Forum (2016), Future of jobs.

Figure 18 : Description of new immigration reform

I-Squared Act (2015)	Startup Act (2015)	S. 744 (2013)
Immigrant Visa Reforms <u>Family-based visas</u> <ul style="list-style-type: none"> Per country limits increase from 7% to 15%. <u>Employment-based (EB) visas</u> <ul style="list-style-type: none"> Maintains current cap, but exempts the following categories: <ul style="list-style-type: none"> Dependents of EB visa-holders STEM degree holders (master's or higher) from U.S. college or university Two EB-1 eligibility occupational categories: (1) workers with extraordinary ability and (2) outstanding professors and researchers. Per country limits are eliminated. Recaptures unused EB visas between FY 1992 and FY 2013. Ensures full utilization of EB visa within a fiscal year (unused visas roll over to the following fiscal year). 	Immigrant Visa Reforms <u>Family-based visas</u> <ul style="list-style-type: none"> Per country limits increase from 7% to 15%. <u>Employment-based (EB) visas</u> <ul style="list-style-type: none"> Creates a new visa for U.S.-educated foreign students who hold an advanced STEM degree, capped at 50,000 per year. Grants visa recipients conditional permanent resident status for 5 years if they remain actively engaged in a STEM field. After five years, the conditional status can be lifted and the visa holder can become a regular legal permanent resident (LPR). Creates new immigrant entrepreneur visa for H-1B or F-1 visa holders, capped at 75,000 per year. Grants conditional permanent residence for 4 years. Criteria for first year: <ul style="list-style-type: none"> Registers at least one new business. Employ at least 2 full-time employees. Invest or raises capital investment of at least \$100,000. Criteria for next 3 years: <ul style="list-style-type: none"> Employ at least 5 full-time employees. Conditional status can be lifted after the 4 years. Per-country limits are eliminated. 	Immigrant Visa Reforms <u>Family-based visas</u> <ul style="list-style-type: none"> Reduces minimum number of family visas from 226,000 to 161,000 Removes the cap on spouses or children of LPRs (F-2A visa). This becomes an immediate relative category. Eliminates the F-4 visa for siblings of U.S. citizens. Restricts immigration of married children of U.S. citizens (the F-3 visa) to individuals aged 31 and younger. <u>Employment-based (EB) visas</u> <ul style="list-style-type: none"> Maintains current cap (140,000), but exempts spouses and children. Removes cap on immigrants with certain extraordinary abilities (EB-1). Exempts from caps: immigrants holding a doctorate or the foreign equivalent, STEM immigrants with an MA or higher and a job offer, and certain physicians. Creates an EB-6 visa for entrepreneurs with 10,000 visas. <u>Other changes</u> <ul style="list-style-type: none"> Clears "backlog" by 2023. Recaptures unused family/EB visas between FY 1992 and FY 2013. A new merit visa would award points to prospective immigrants based on education, employment, length of residence and other considerations. Cap would fluctuate between 120,000 and 250,000 based on demand. Eliminates Diversity Visa

I-Squared Act (2015)	Startup Act (2015)	S. 744 (2013)
Non-Immigrant Visa Reforms <u>H-1B</u> <ul style="list-style-type: none"> – The H-1B cap is raised from 65,000 to 155,000. – Eliminates numerical limit for H-1B visas allocated for foreign graduates of U.S. universities with advanced degrees, currently capped at 20,000 – A market-based “escalator” is established that allows the supply of H-1B visas to meet the rise or fall in demand from year-to-year or within a fiscal year. From year to year, the cap can increase or decrease by no more than 20,000 visas, but can never fall below 115,000 or rise above 195,000. – Spouses of H-1Bs can work. – Proposes a 60-day “grace period” for H-1B visa holders who either quit or are fired from their job before their period of authorized admission expires to transition into a new job have a new employer file a sponsoring visa petition. – H-1Bs (as well as E, L, O and P visa holders) may renew their nonimmigrant while in the United States, if still eligible. 		Non-Immigrant Visa Reforms <u>H-1B</u> <ul style="list-style-type: none"> – Expands H-1B cap from 65,000 plus 20,000 advanced degree holders, to 115,000 plus 25,000 advanced degree holders. Base cap may go as high as 180,000 based on previous year’s demand. – Increases prevailing wage requirements for H-1B visa holders, mandates advertising job to American workers first. – Spouses of H-1Bs can work if the sending country permits reciprocal employment of U.S. nationals. – Phases in maximum share of employees that may be on H-1B and L-1 visas. By FY2016, employers who are more than 50% H-1B and L-1 cannot apply for further visas. – Allows spouses and children to accompany H-1B workers without counting against the cap and allows spouses to work. <u>Other</u> <ul style="list-style-type: none"> – A new W visa would allow between 20,000 and 200,000 low-skilled workers per year. The cap would start at 20,000 and escalate to 75,000 by the fourth year. A demand-based formula would determine changes after that.

Source: <http://bipartisanpolicy.org/blog/analysis-new-high-skilled-immigration-reform-bills/>.

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT ECONOMIC AND SCIENTIFIC POLICY **A**

Role

Policy departments are research units that provide specialised advice to committees, inter-parliamentary delegations and other parliamentary bodies.

Policy Areas

- Economic and Monetary Affairs
- Employment and Social Affairs
- Environment, Public Health and Food Safety
- Industry, Research and Energy
- Internal Market and Consumer Protection

Documents

Visit the European Parliament website:
<http://www.europarl.europa.eu/supporting-analyses>

PHOTO CREDIT:
iStockphoto.com; Shutterstock/beboy



ISBN 978-92-823-9003-0- (paper)
ISBN 978-92-823-9002-3 (pdf)

doi:10.2861/886341 (paper)
doi:10.2861/184876 (pdf)

