

FSL0537

Desenvolvimento Econômico e Mudança Social  
“A Divisão Social do Trabalho no Século XXI”.

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Graduação em Ciências Sociais – USP, Semestre I, 2018

## **14. A divisão social do trabalho nas sociedades pós-industriais: declínio do emprego industrial e polarização social (21 e 22 de junho)**

- Martin Ford (2015) *Rise of Robots: Technology and the Threat of a Jobless Future*. Basic Books. [Cap. 2: Is This Time Different?; pp. 29-62] DISPONÍVEL TAMBÉM EM ESPANHOL (*El Ascenso de los Robots: Tecnología y la amenaza de un futuro sin empleos; Cap. 2 Será diferente esta vez?*).
- Sassen, Saskia (1998) *Globalization and its discontents*. New York, The New Press. [Cap. 7: Service employment regimes and the new inequality; pp. 137-152].
- Fiona Tregenna (2016) “Deindustrialisation: An issue for both developed and developing countries”. In: John Weiss & Michael Tribe. *Routledge Handbook of Industry and Development*. [Cap. 6: pp. 97-115]
- Nir Jaimovich e Henry E. Siu (2012) “The Trend Is the Cycle: Job Polarization and Jobless Recoveries” National Bureau of Economic Research. Working Paper 18334 <http://www.nber.org/papers/w18334>.

## **15 Automação e Inteligência Artificial: existe um futuro para o trabalho humano? (28 e 29 de junho)**

- Klaus Schwab (2016) *A Quarta Revolução Industrial*. São Paulo, Edipro. [Cap. 3. Impactos; pp. 35-42].
- Martin Ford (2015) *Rise of the Robots: Technology and the Threat of a Jobless Future*. Basic Books. [Cap. 3: Information Technology: An Unprecedented Force for Disruption; pp. 63-82]. DISPONÍVEL TAMBÉM EM ESPANHOL (*El Ascenso de los Robots: Tecnología y la amenaza de un futuro sin empleos; cap. 3*)
- Erik Brynjolfsson & Andrew McAfee (2014) *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. W. W. Norton. [Cap. 2: The skills of the new machines: technology races ahead; pp. 13-33]

Is This Time  
Different?

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# **RISE OF THE ROBOTS**

**TECHNOLOGY AND THE  
THREAT OF A JOBLESS FUTURE**

**MARTIN FORD**

“There can be no gainsaying of the fact that a great revolution is taking place in the world today. In a sense it is a triple revolution: that is, a **technological revolution**, with the impact of automation and cybernation; then there is a **revolution in weaponry**, with the emergence of atomic and nuclear weapons of warfare; then there is a **human rights revolution**, with the freedom explosion that is taking place all over the world. Yes, we do live in a period where changes are taking place. And there is still the voice crying through the vista of time saying, “Behold, I make all things new; former things are passed away.” [Isaías, 61].

Reverendo Martin Luther King, Jr.,

*Sermão Remaining Awake Through a Great Revolution, 31 de março de 1968,  
Washington National Cathedral.*

Apud Martin Ford, 2015

# Tecnologia X Emprego: um pavor não tão novo...

“Ad Hoc Committee on the Triple Revolution”. 1964

“Two of the revolutionary forces identified in the report—**nuclear weapons and the civil rights movement**—are indelibly woven into the historical narrative of the 1960s. The third revolution, which comprised the bulk of the document’s text, has largely been forgotten. The report predicted that “**cybernation**” (or **automation**) would soon result in an economy where “**potentially unlimited output can be achieved by systems of machines which will require little cooperation from human beings.**” The result would be **massive unemployment, soaring inequality, and, ultimately, falling demand for goods and services** as consumers increasingly lacked the purchasing power necessary to continue driving economic growth”.

# continuação...

“The Ad Hoc Committee went on to propose a radical solution: the eventual implementation of a **guaranteed minimum income** made possible by the “**economy of abundance**” such widespread automation could create, and which would “take the place of the patchwork of welfare measures” that were then in place to address poverty”. (pg. 30)

# continuação...

In 1949, at the request of the *New York Times*, *Norbert Wiener*, an internationally renowned mathematician at the Massachusetts Institute of Technology:

“Wiener argued that **‘if we can do anything in a clear and intelligible way, we can do it by machine’**, and warned that that this could ultimately lead to ‘an industrial revolution of unmitigated cruelty’ powered by machines capable of **‘reducing the economic value of the routine factory employee to a point at which he is not worth hiring at any price.’**”

# A grande transformação

The nearly perfect historical **correlation between increasing productivity and rising incomes broke down**: wages for most Americans stagnated and, for many workers, even declined; income inequality soared to levels not seen since the eve of the 1929 stock market crash; and a new phrase—**“jobless recovery”**—found a prominent place in our vocabulary. In all, we can enumerate at least **seven economic trends** that, taken together, suggest a transformative role for advancing information technology.

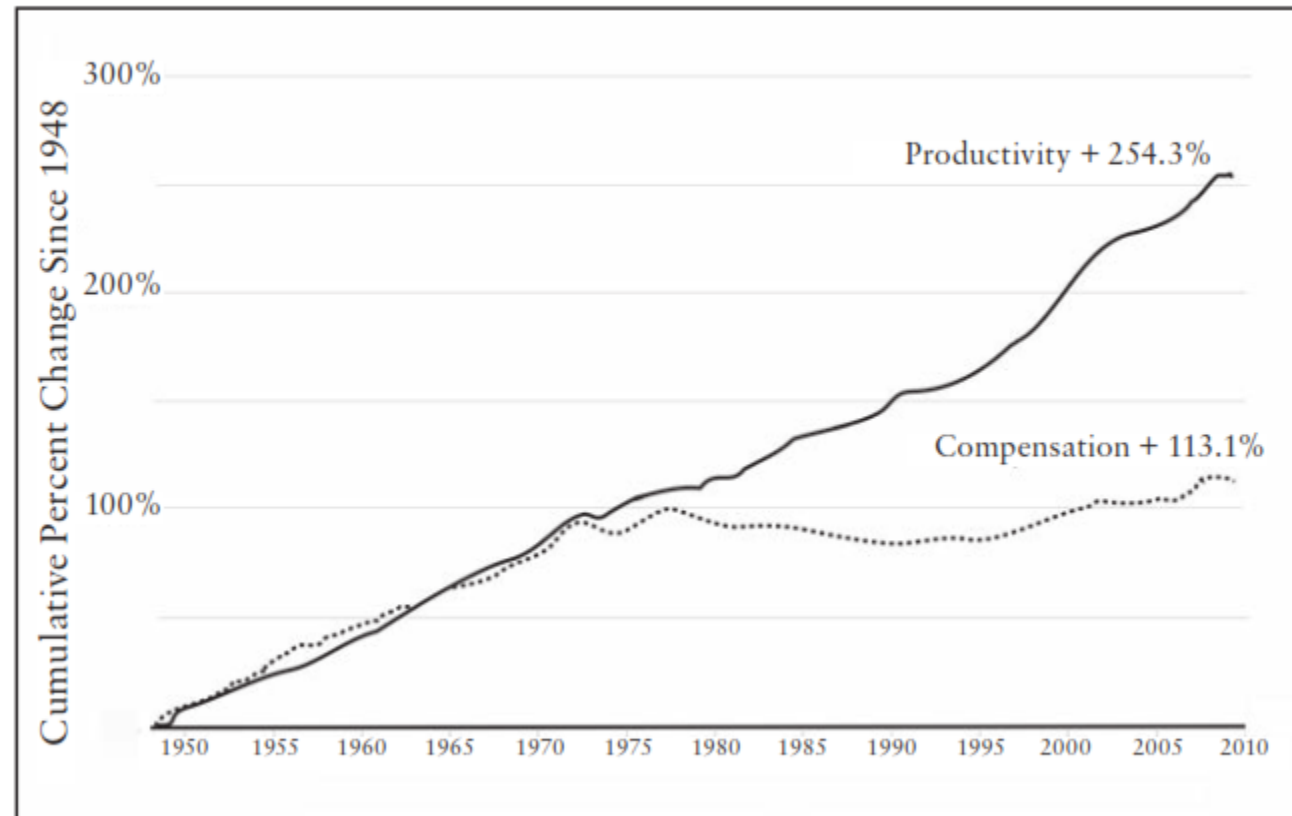


# Sete tendências “mortais”

- ✓ Stagnant Wages
- ✓ A Bear Market (preços em declínio) for Labor’s Share, and a Raging Bull (touro indomável) for Corporations
- ✓ Declining Labor Force Participation
- ✓ Diminishing Job Creation, Lengthening Jobless Recoveries, and Soaring Long-Term Unemployment
- ✓ Soaring Inequality
- ✓ Declining Incomes and Underemployment for Recent College Graduates
- ✓ Polarization and Part-Time Jobs

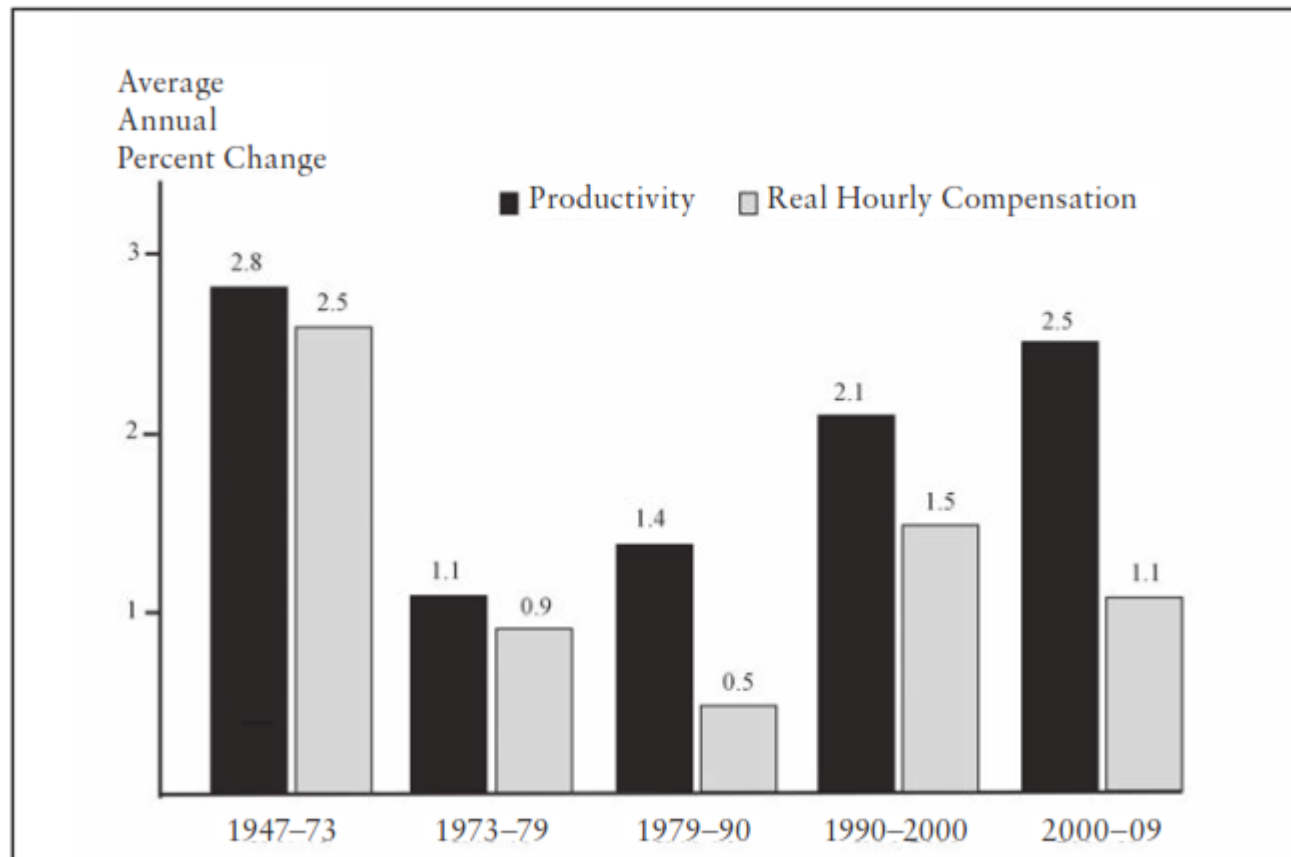
# Stagnant Wages

Figure 2.1. Growth of Real Hourly Compensation for Production and Nonsupervisory Workers Versus Productivity (1948–2011)



SOURCE: Lawrence Mishel, Economic Policy Institute, based on an analysis of

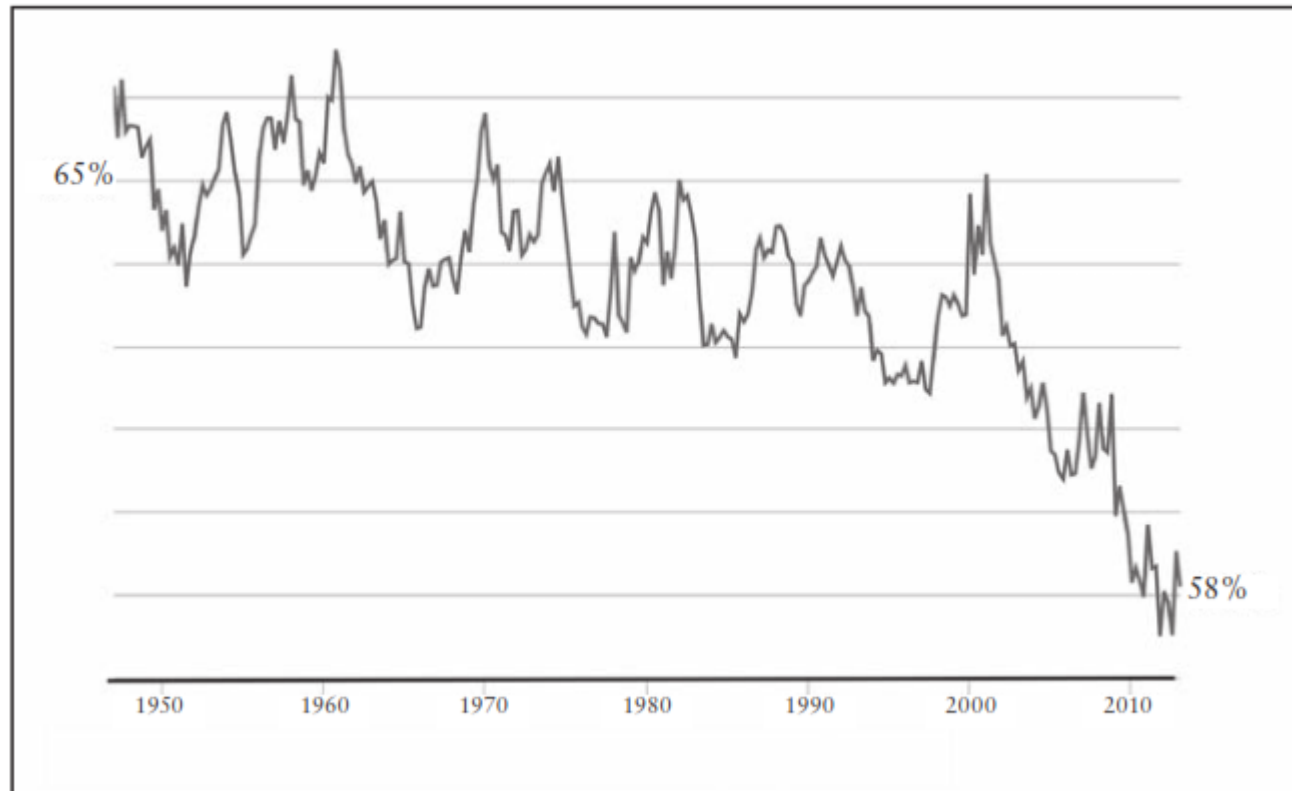
Figure 2.2. Productivity Growth Versus Compensation Growth



SOURCE: US Bureau of Labor Statistics.<sup>14</sup>

# Distribuição funcional da renda: **trabalho X capital**

Figure 2.3. US Labor's Share of National Income (1947–2014)



SOURCE: US Bureau of Labor Statistics and Federal Reserve Bank of St. Louis

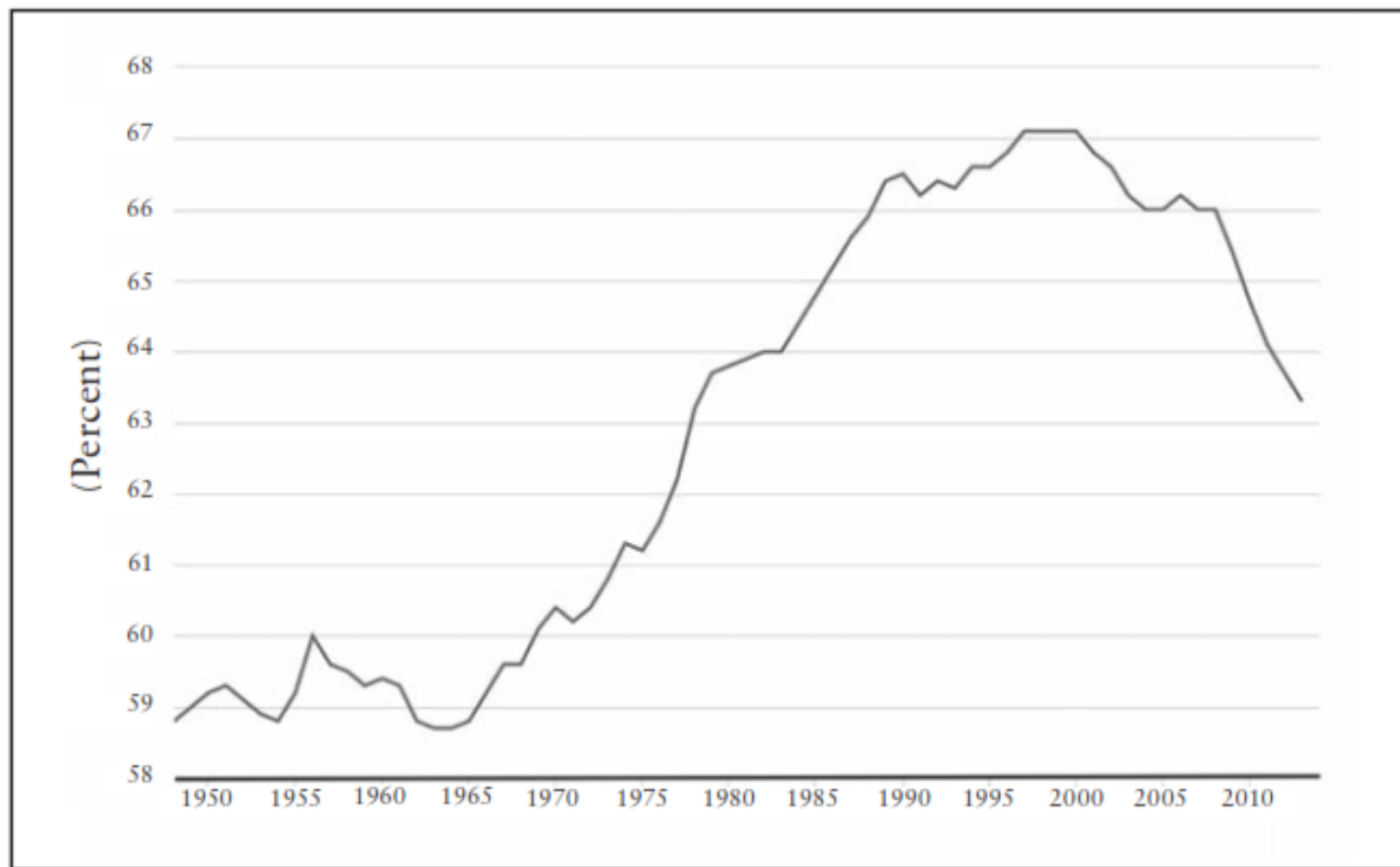
# Concentração de renda no topo

Between 1993 and 2010 over **half of the increase in US national income went to households in the top 1 percent** of the income distribution. Since then, things have only gotten worse. In an analysis published in September 2013, economist Emmanuel Saez of the University of California, Berkeley, found that an astonishing **95 percent of total income gains during the years 2009 to 2012 were hoovered up by the wealthiest 1 percent.**

“both the overall labor force participation rate and the participation rate for prime working-age adults have fallen by about three percentage points since 2000—and about half of that decline came before the onset of the 2008 financial crisis.”

“The decline in labor force participation has been accompanied by an explosion in applications for the Social Security disability program...”

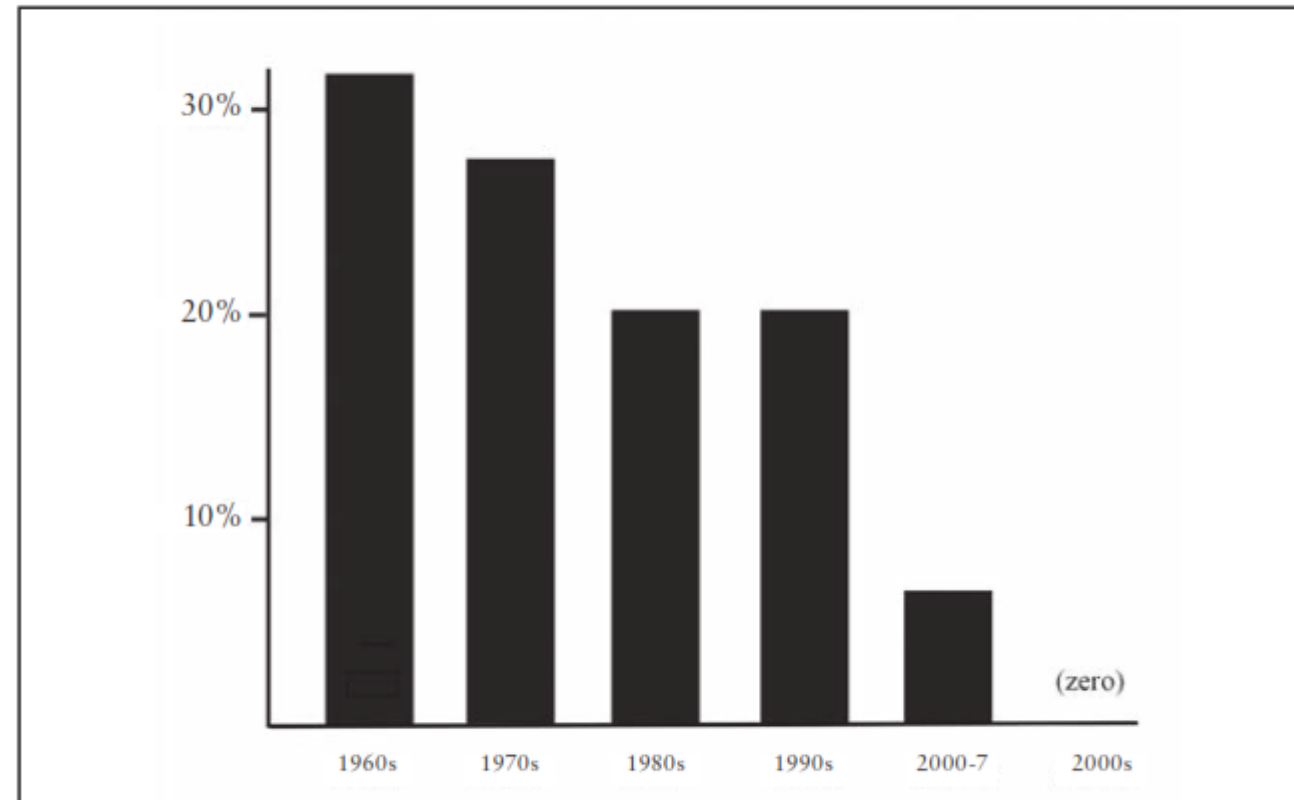
Figure 2.5. Labor Force Participation Rate



SOURCE: US Bureau of Labor Statistics and Federal Reserve Bank of St. Louis (FRED).<sup>25</sup>

# Volume de empregos

Figure 2.6. US Job Creation by Decade



SOURCE: US Bureau of Labor Statistics and Federal Reserve Bank of St. Louis (FRED).<sup>29</sup>

# Desemprego estrutural e desprofissionalização

**Extended unemployment is a debilitating problem.** Job skills erode over time; the risk that workers will become discouraged increases, and many employers seem to actively discriminate against the long-term unemployed, often refusing even to consider their résumés. Indeed, a field experiment conducted by Rand Ghayad, a PhD candidate in economics at Northeastern University, showed that **a recently unemployed applicant with no industry experience was actually more likely to be called in for a job interview than someone with directly applicable experience who had been out of work for more than six months.**



# O balanço dos empregos

In a 2012 study, economists Nir Jaimovich and Henry E. Siu analyzed data from recent US recessions and found that the jobs **mostly likely to permanently disappear are the good middle-class jobs, while the jobs that tend to get created during recoveries are largely concentrated in low-wage sectors like retail, hospitality, and food preparation** and, to a lesser extent, in high-skill professions that require extensive training. This has been especially true over the course of the recovery that began in 2009.

Many of these new low-wage jobs are also part-time. Between the start of the Great Recession in December 2007 and August 2013, about **5 million full-time jobs were vaporized, but the number of part-time jobs actually increased by approximately 3 million.**

# Automação e globalização da produção

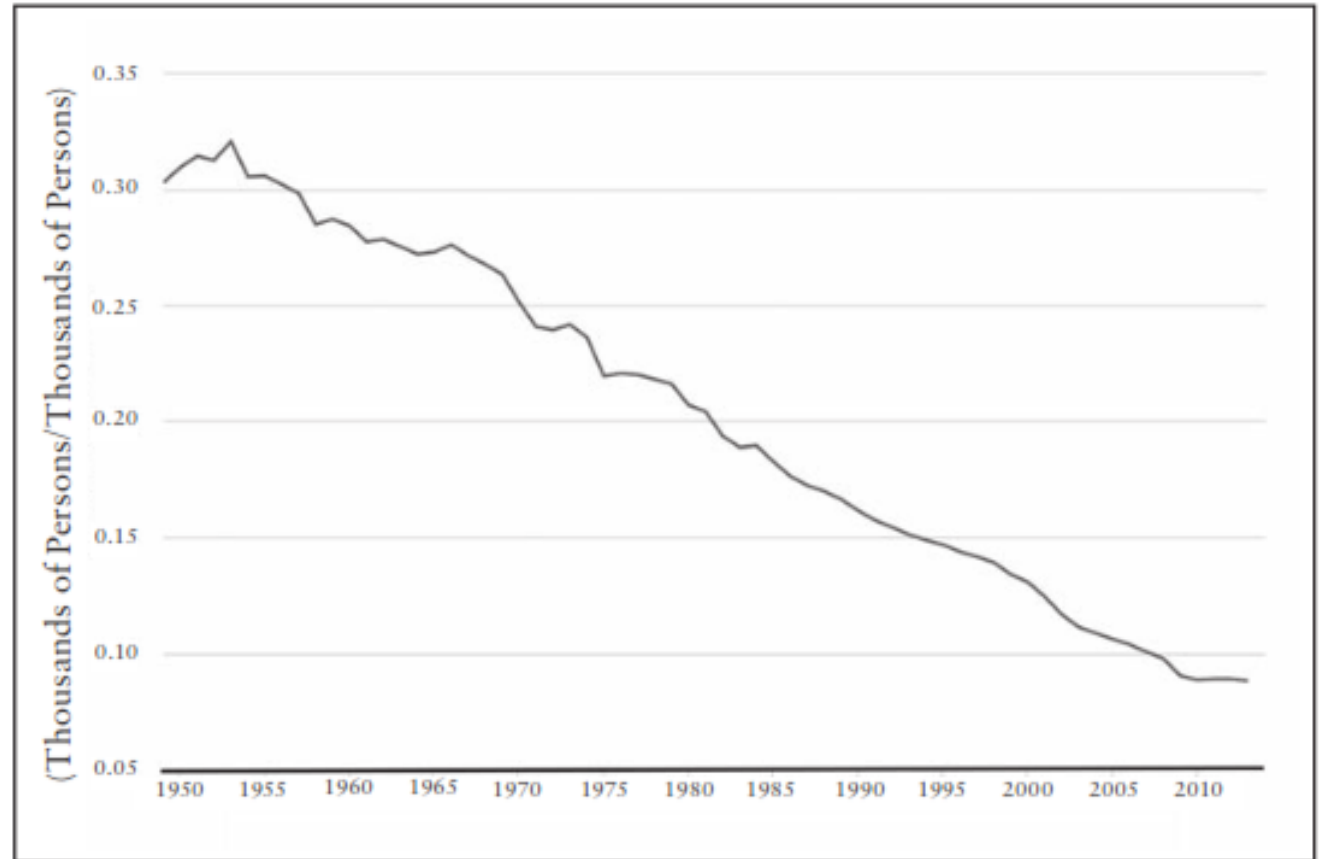
Autor concludes that **the primary driving forces behind job market polarization are “the automation of routine work** and, to a smaller extent, the international integration of labor markets through trade and, more recently, offshoring.

Aside from advancing information technology, there are three other primary possibilities that might conceivably have contributed to all, or at least most, of our seven economic trends: **globalization, the growth of the financial sector, and politics** (in which I include factors like deregulation and the decline of organized labor).

# Declínio do emprego industrial

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Figure 2.8. Percentage of US Workers in Manufacturing



SOURCE: US Bureau of Labor Statistics and Federal Reserve Bank of St. Louis (FRED).<sup>51</sup>

# Financeirização

In 1950, the US financial sector represented about 2.8 percent of the overall economy. By 2011 finance-related activity had grown more than threefold to about 8.7 percent of GDP. The compensation paid to workers in the financial sector has also exploded over the past three decades, and is now about 70 percent more than the average for other industries. The assets held by banks have ballooned from about 55 percent of GDP in 1980 to 95 percent in 2000, while the profits generated in the financial sector have more than doubled from an average of about 13 percent of all corporate profits in the 1978–1997 timeframe to 30 percent in the period between 1998 and 2007.

# Rentismo e especulação

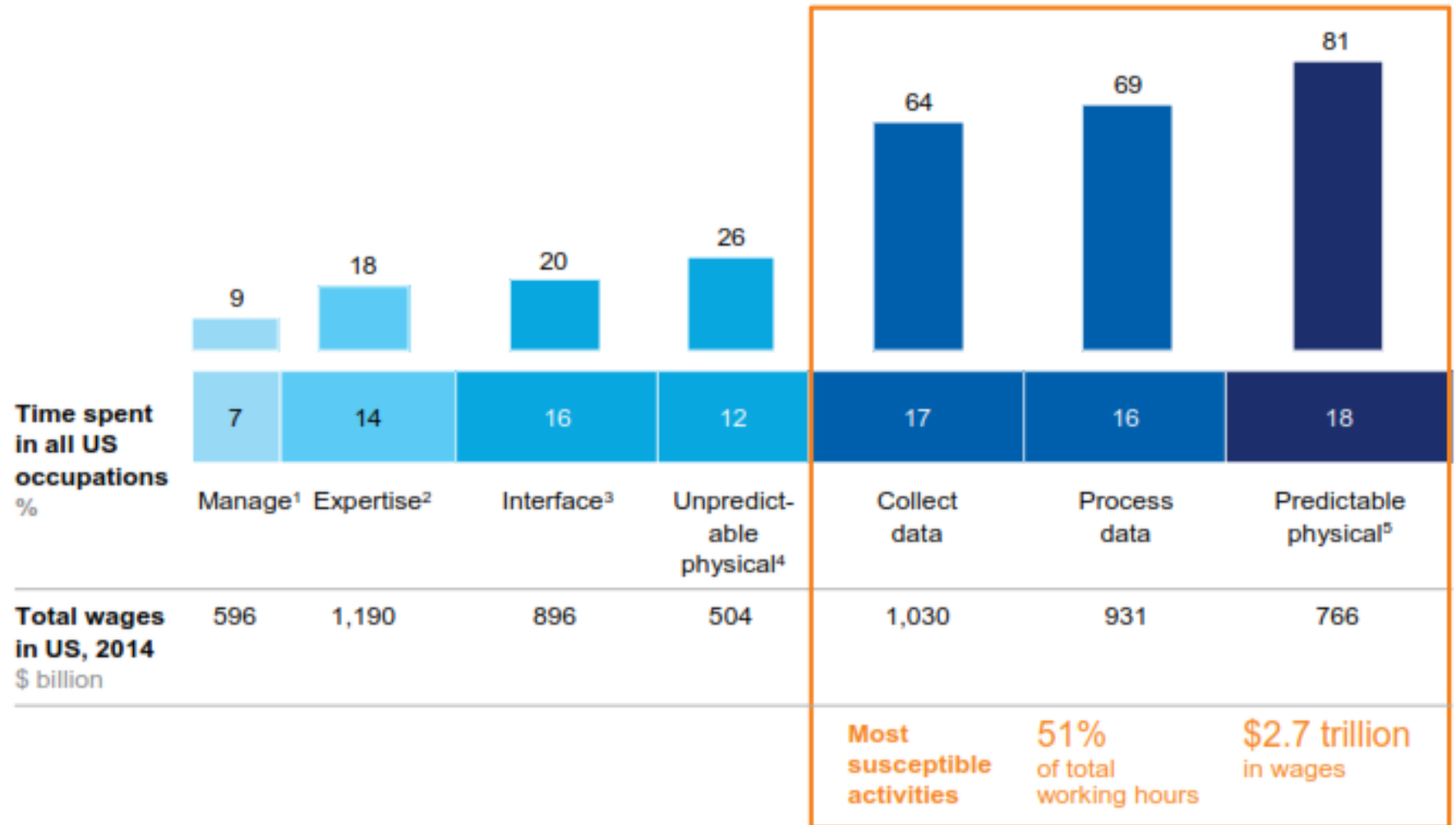
- The primary complaint leveled against the financialization of the economy is that much of this activity is geared toward rent seeking. In other words, the financial sector is not creating real value or adding to the overall welfare of society; it is simply finding ever more creative ways to siphon profits and wealth from elsewhere in the economy.
- It's also important to realize that growth in the financial sector has been highly dependent on advancing information technology. Virtually all of the financial innovations that have arisen in recent decades—including, for example, collateralized debt obligations (CDOs) and exotic financial derivatives—would not have been possible without access to powerful computers.

# Declínio da sindicalização

In the 1950s, more than a third of the US private sector workforce was unionized. By 2010, that number had declined to about 7 percent. At the height of its power, organized labor was a powerful advocate for the middle class as a whole. The fact that workers were able to consistently capture the lion's share of productivity growth in the 1950s and '60s can likely be attributed at least in part to the negotiating power of unions during that period. The situation today is very different; unions now struggle simply to maintain their existing membership.

## Time spent on activities that can be automated by adapting currently demonstrated technology

%



1 Managing and developing people.

2 Applying expertise to decision making, planning, and creative tasks.

3 Interfacing with stakeholders.

4 Performing physical activities and operating machinery in unpredictable environments.

5 Performing physical activities and operating machinery in predictable environments.

NOTE: Numbers may not sum due to rounding.

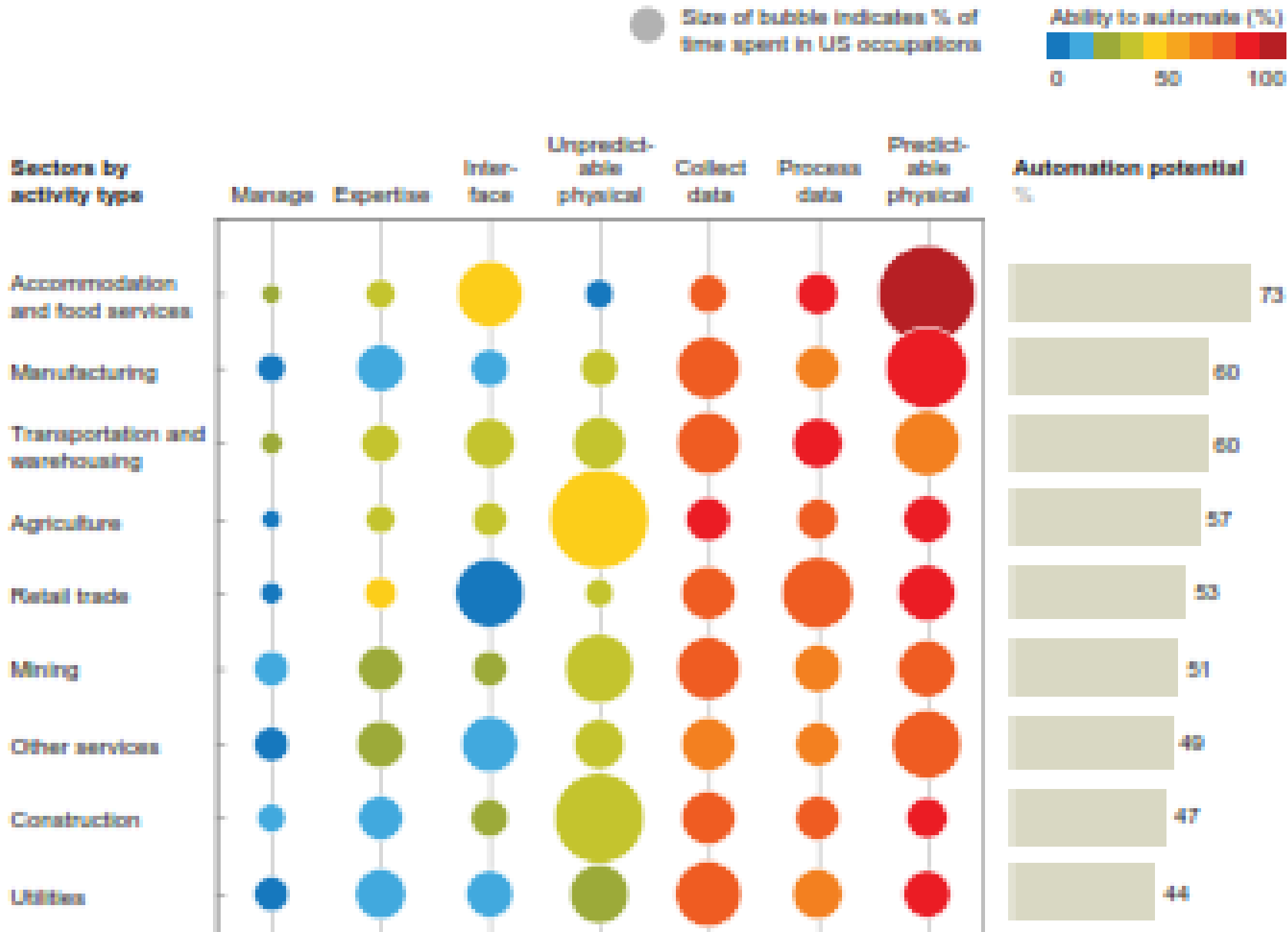
Five factors affect the pace and extent of automation; we model using four stages

Key factor	Technical feasibility		Cost of developing and deploying	Labor market dynamics	Economic benefits	Regulatory and social acceptance
Impact on pace and extent of automation	For an activity to be automated, every capability utilized for that activity must reach the required level of performance	Capabilities need to be integrated to form solutions	Costs associated with developing as well as deploying different solutions determine the pace of reaching economic feasibility	Economic feasibility of automation will depend on comparison with cost of human labor, affected by supply and demand dynamics	In addition to labor cost savings, automation could bring more benefits to employers, including increased quality and efficiency and decreased error rate	Adoption of automation shaped by pace of organizational change, policy choices, and acceptance to stakeholders



Exhibit E4

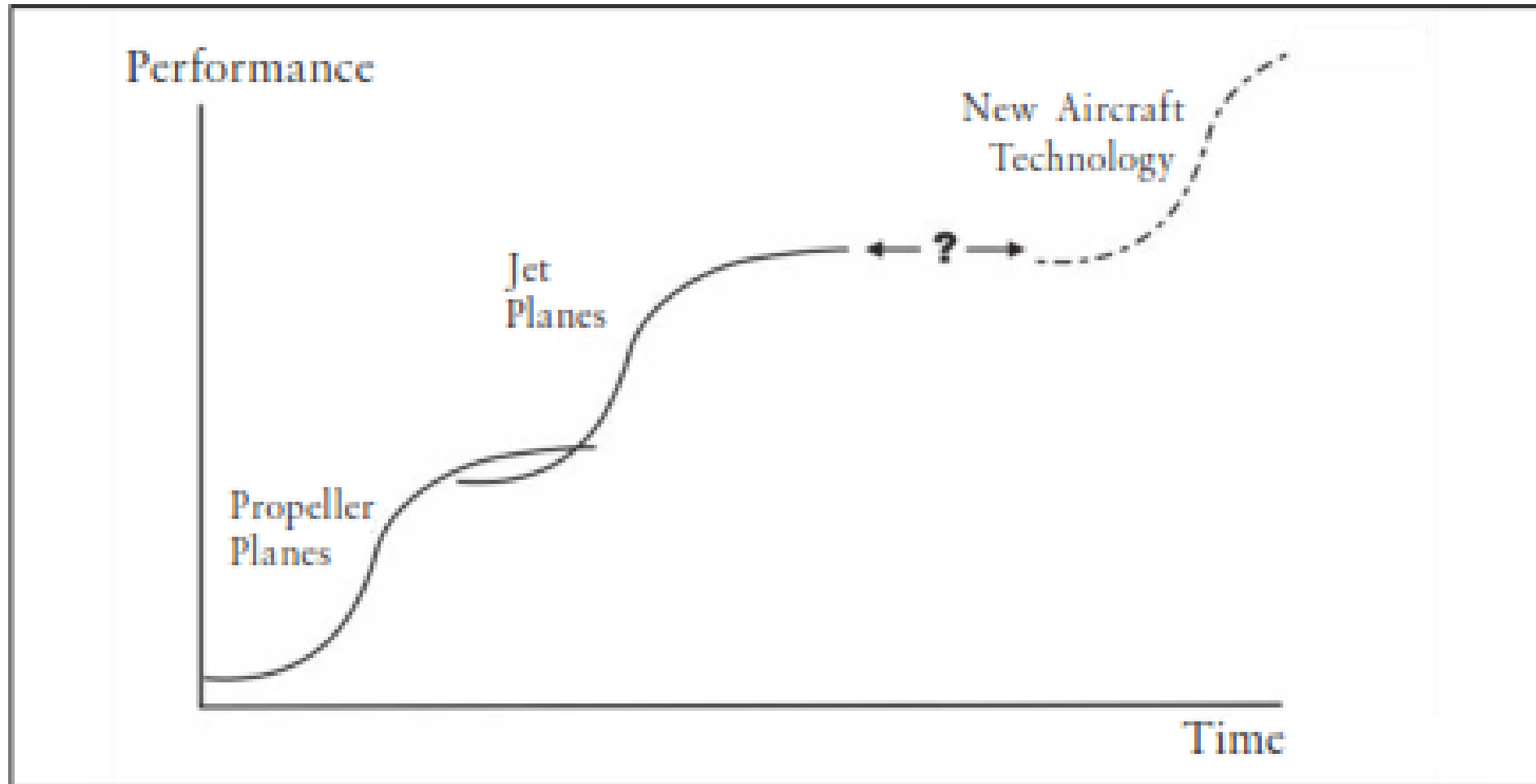
Technical potential for automation across sectors varies depending on mix of activity types





SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Figure 3.1. Aircraft Technology S-Curves



- YouTube was founded in 2005 by three people. Less than two years later, the company was purchased by Google for about \$1.65 billion. At the time of its acquisition, YouTube employed a mere sixty-five people, the majority of them highly skilled engineers. That works out to a valuation of over \$25 million per employee. In April 2012, Facebook acquired photo-sharing start-up Instagram for \$1 billion. The company employed thirteen people. That's roughly \$77 million per worker. Fast-forward another two years to February 2014 and Facebook once again stepped up to the plate, this time purchasing mobile messaging company WhatsApp for \$19 billion. WhatsApp had a workforce of fifty-five—giving it a valuation of a staggering \$345 million per employee.