

This PDF is a selection from a published volume from the National Bureau of Economic Research

Volume Title: The Economics of Artificial Intelligence: An Agenda

Volume Authors/Editors: Ajay Agrawal, Joshua Gans, and Avi Goldfarb, editors

Volume Publisher: University of Chicago Press

Volume ISBNs: 978-0-226-61333-8 (cloth); 978-0-226-61347-5 (electronic)

Volume URL: <http://www.nber.org/books/agra-1>

Conference Date: September 13–14, 2017

Publication Date: May 2019

Chapter Title: Artificial Intelligence, Income, Employment, and Meaning

Chapter Author(s): Betsey Stevenson

Chapter URL: <http://www.nber.org/chapters/c14026>

Chapter pages in book: (p. 189 – 195)

Artificial Intelligence, Income, Employment, and Meaning

Betsey Stevenson

The evolution of artificial intelligence (AI) evokes strong emotions in people. Some imagine a dystopia in which people are replaced by machines. Machines will develop the content we read, and the entertainment we enjoy. Artificial intelligence will pick our friends and our politicians, and ultimately take away any sense of human agency. And worst of all, those machines will deprive us of work. Human beings will lose meaning and income, and perhaps ultimately, be driven to extinction.

At the other end of the spectrum are those that envision the potential for utopia. With machines doing all the work, people will have plenty of income, yet very little unpleasant work to do. Instead, people will spend their days enjoying art and music. They will pursue their passions unburdened by the need to provide for their basic wants. They will feed their intellectual curiosity and fulfill the human demand for personal interactions. In short, people will be able to enjoy their lives with the freedom from time and money constraints that artificial intelligence provides.

So who is right?

7.1 Income Is Not the Problem

Economists think that we know the answer, or at least part of it. Most economists believe that automation promises a future of higher income that

Betsey Stevenson is associate professor of economics and public policy at the Gerald R. Ford School of Public Policy, University of Michigan; a visiting associate professor of economics at the University of Sydney; a research associate of the National Bureau of Economic Research; a research affiliate of the Centre for Economic Policy Research; and a research fellow of CESifo.

For acknowledgments, sources of research support, and disclosure of the author's material financial relationships, if any, please see <http://www.nber.org/chapters/c14026.ack>.

stems from the higher productivity that artificial intelligence will provide. In September 2017, the Chicago Booth IGM Forum's Economic Experts Panel asked forty-one economists from top universities in the United States whether they strongly agreed, agreed, were uncertain, disagreed, or strongly disagreed with the following statement: "Rising use of robots and artificial intelligence in advanced countries is likely to create benefits large enough that they could be used to compensate those workers who are substantially negatively affected for their lost wages."¹

The answer was clear; no one disagreed with that statement. A few economists—10 percent—were uncertain, and the modal answer was agree, rather than strongly agree. Yet, it is clear that economists believe that artificial intelligence represents an opportunity for substantial economic gains. Indeed, productivity gains have been at the heart of improvements in living standards from the beginning of time. And so, it is difficult to imagine a world in which productivity gains do not generate benefits sufficiently large that we *could* compensate the losers.

Therefore, the relevant question is whether we *would* compensate the losers. Here economists are more skeptical. Economics tells us that there will be income gains, but our social and political structure help determine how they will be distributed.

7.2 Who Gets the Gains from Automation?

Much of the skepticism about being able to successfully redistribute income comes from a lack of trust that the political process will successfully manage redistribution in a world in which income is primarily generated by capital. The history of the last several decades has certainly not been encouraging on that front. The share of income held by the top 1 percent of the population has risen to nearly 20 percent, from around 10 percent in 1980, while the share going to the bottom 50 percent of the population has fallen to 12 percent from 20 percent in 1980.² Currently we are failing to redistribute the gains from technological advances, and so the concerns that distribution will be a challenge are supported by our recent past.

7.3 What Will We Do with Ourselves?

Yet, the concern runs deeper than wondering whether as a society we could manage to redistribute income. Most economists are concerned about how we will allocate jobs, and underneath that concern lies a belief that work matters independent of the earnings that are generated by the work.

1. IGM Economic Experts Panel (2017).

2. World Wealth and Income Database. <http://wid.world/country/usa/>.

Essentially, many people are skeptical that people could successfully find engaging and emotionally rewarding ways to spend their time if they were not working. One of the IGM Forum panelists, Robert Hall, expressed his concern most concretely: “Those not in the labor force are unhappy and inclined to opioids.”

So economists are fearful about what will happen if people lose employment opportunities, yet economic history provides economists with optimism that employment will adapt. Which is why so many economists wonder what, if anything, will be different about artificial intelligence compared to the industrial revolution or other important periods of rapid technological change.

Economists’ intuition around the impact of technological change on employment comes from considering how employment has adapted following previous periods of technological change. Here, once again, economists have a united view: technological change has not historically reduced employment. This view of economists is seen in a February 2014 question posed to the Chicago Booth IGM Forum’s Economic Experts Panel. Forty-four economists from top universities in the United States were asked whether they strongly agreed, agreed, were uncertain, disagreed, or strongly disagreed with the following statement: “Advancing automation has not historically reduced employment in the United States.”³

Economists are roughly united in agreeing with this statement, with only 4 percent disagreeing and 8 percent uncertain.⁴

Yet, when the IGM Economic Experts Panel was asked in September 2017 whether they strongly agreed, agreed, were uncertain, disagreed, or strongly disagreed with the following statement: “Holding labor market institutions and job training fixed, rising use of robots and artificial intelligence is likely to increase substantially the number of workers in advanced countries who are unemployed for long periods.”

This is where economics lends a less clear answer and economists are divided on this question: 44 percent agree, 26 percent disagree, and 31 percent are uncertain. Is this a contradiction or a different view about artificial intelligence compared to other technologies? I don’t think it is either. Instead, I believe these answers reflect the difference in what happens in the long run versus the short run. In the long run, technological change leads to prosperity and new jobs arise as we adjust to our new wealth, develop new skills, and come up with new ways to use human skills. In the short run, however, there is often a disruption.

3. IGM Economic Experts Panel (2014).

4. The figure of 88 percent is adjusted for respondents’ confidence in their answer. Among all respondents, 76 percent agreed and 9 percent had no opinion.

7.4 The Long Run

One of the confusions around what will happen to employment and unemployment stems from not separating short-run versus long-run effects. When most of us think about artificial intelligence and increased automation, we are trying to think about what the long-run future holds, and our intuition comes from considering how growth has changed how people live across generations. It is not how it has changed our lives over the last five years, but instead contrasting how we live our lives—and if you are reading this it involves large periods of intellectual contemplation—with how our own family members ten generations back spent their lives. In the 1800s, the vast majority of Americans worked in agriculture and very few of them spent their time thinking about ideas. Today, 2 percent of Americans are directly employed in agriculture. There are more people employed in the public school system than in agriculture. In sum, few of us are in the jobs or careers that our great-great-great-great grandparents were in and many of us work in jobs today that did not exist a single generation ago.

One of the IGM panelists, Nancy Stokey, made it clear she was thinking about the long run: “If this had been true over the last two centuries, almost no one would be working anymore.” When you take a really long-run view, it has to be true that automation has not reduced employment, at least not at as rapid a pace as the automation has itself occurred. In fact, many economists regard it as a puzzle that paid work has been remarkably stable even as nations have become increasingly prosperous, and its citizens might have been expected to use more of their higher income to choose to consume more leisure.

7.4.1 In the Long Run, Employment and Hours Worked Have Declined

Yet, despite our intuition, employment has tended to decline with technological progress. The difference between our beliefs about how technological progress has impacted employment and what has actually happened reflect two things. The first is that hours worked and employment has not declined by as much as one might have predicted. The second is that economists tend to think about employment in a model in which people who want to work can find jobs.

Hours of work have declined in most countries with productivity growth. Figure 7.1 shows average annual hours worked in a handful of developed countries since 1970. Annual hours worked declined fairly steadily in France, Germany, and Japan. The United States and the United Kingdom had smaller declines. Yet in each country, the annual hours worked fell.

To think more broadly about employment, childhood employment has been almost eliminated in developed countries. And employment of young adults, those age fifteen to twenty-five have declined as young people focus on investing in further human capital. On the other end of the life cycle, life

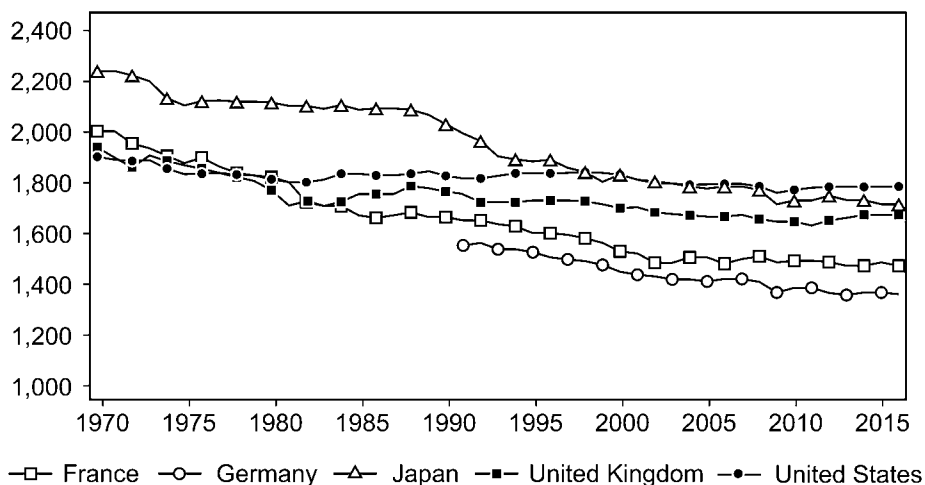


Fig. 7.1 Average annual hours worked

Source: OECD (2017).

expectancy has increased while retirement ages have fallen in most developed countries.

Work has declined in terms of the number and share of our life in terms of hours and days that we are going to spend working. The decline in work has occurred through the interaction of economic growth with government policies. For example, extended retirement has been facilitated by government pension and retirement programs. The dramatic reduction in child labor was facilitated by child labor laws. The demand for these programs and regulations is itself facilitated by the higher income that productivity growth creates.

Decreases in employment because of childhood education and retirement are thought to be improvements in living standards and not something we need or want to fix. However, they do require income redistribution. Older generations must support children, either through families or government redistribution (such as child tax credits, child allowances, child health care subsidies, etc.). Yet, most people agree that this is an improvement—few are trying to get kids back into the workforce to financially support themselves. Something similar is true at the other end of the life cycle. While the elderly can save for retirement, redistribution allows those who are retired to share in continued economic growth.

7.5 Short-Run Disruption

The real uncertainty with artificial intelligence is what will the disruption be like and how will we manage people through it. Most economists think

there will be people who are hurt through decreased demand for their skills. There might be longer spells of unemployment and a larger need for worker retraining. There might be jobs that workers do not want or are not qualified to do. While we can prepare a new generation for a world in which robots do many of the jobs, preparing a generation midway through their lives is harder. People are resistant to starting over, they mourn what they have lost, and they resent a definition of progress that leaves them diminished in status and income.

The loss of income should be easier to solve than the loss of status. So how important is work and what do we know about it? Is work about the income that it generates or about the meaning and order it gives to our days? Much of the debate about the potential impact of automation on employment is really a debate about how we will spend our time. So it is useful to separate out the question of what will we do with our time if the robots take our jobs from the question of whether we can find a stable and fair distribution of income in such a scenario. And it is useful to realize that the answers in the long run may be very different to what happens in the short run. Yet, how we handle the short run will ultimately influence our long-run outcomes.

7.6 There Is Work outside of Employment

Work is a broader concept than paid labor. Paid labor is the result of a trade-off between leisure, home-produced goods, and market-produced goods. This matters from a measurement perspective because the 1970s was a period of very rapid substitution, with nonmarket-produced goods being substituted by market-produced goods. Women stopped making clothes and making pies and cakes from scratch, and started going to work, buying clothes, and buying pies and cake mixes. Technological change occurred in a way that crowded out homemade goods and crowded in women's labor force participation.⁵ Should we think about this as increasing or decreasing work? One thing is clear, work shifted from outside our typical measurement scope to inside it. For example, I suspect that there are fewer childcare workers today than forty years ago if you count every stay-at-home mom with children as a childcare worker.

Yet, time-use surveys reveal that the decline in hours worked is smaller than measured hours of employment suggest, at least since the 1970s. If we look at time-use surveys, dads are working more hours, even though they are working less in the labor force.⁶ Once we account for hours spent on childcare and housework, men work more hours than they did in the 1960s.

Why consider childcare and housework hours? If we want to think about really measuring what happens to work we need a more holistic sense of

5. Stevenson and Wolfers (2007).

6. Council of Economic Advisors (2014).

what work is. Particularly if the question is whether we can find meaningful ways to spend our time outside of paid work.

Artificial intelligence won't replace the need for human connection, both in our personal lives and professionally. A robot may be able to care for an elderly bed-bound person, but it is unlikely to produce the joy and satisfaction of connecting with a human being. Will there be more paid jobs caring for one another? Undoubtedly. But will our higher incomes also allow us to choose to work less in order to provide more uncompensated care for our friends and family? I hope so.

7.7 Productivity Growth Ultimately Gives Us Better Lives and More Options

In the end, there are really two separate questions: there is an employment question, in which the fundamental question is, can we find fulfilling ways to spend our time if robots take our jobs? And there is an income question, can we find a stable and fair distribution of income?

The answer to both will depend on not just how technology changes, but how our institutions change in reaction to technological change. Do we embrace technology and increase funding for education, worker training, the arts, and community service? Or do we allow inequality to continue to grow unchecked, pitting workers against those investing in robots?

The challenge for society is to ensure that we solve both problems. That we help shape a society in which people can find fulfilling ways to spend their time. And to solve that problem, we must also solve the separate problem of finding a stable and fair distribution of income.

References

- Council of Economic Advisors. 2014. "Eleven Facts about American Families and Work." https://obamawhitehouse.archives.gov/sites/default/files/docs/eleven_facts_about_family_and_work_final.pdf.
- IGM Economic Experts Panel. 2014. Accessed Dec. 15, 2017. <http://www.igmchicago.org/surveys/robots>.
- . 2017. Accessed Dec. 15, 2017. <http://www.igmchicago.org/surveys/robots-and-artificial-intelligence-2>.
- Organisation for Economic Co-operation and Development (OECD). 2017. "Hours Worked: Average Annual Hours Actually Worked." OECD Employment and Labour Market Statistics (database). Accessed Sept. 13, 2017. <https://stats.oecd.org/Index.aspx?DataSetCode=ANHRS>.
- Stevenson, B., and J. Wolfers. 2007. "Marriage and Divorce: Changes and Their Driving Forces." *Journal of Economic Perspectives* 21 (2): 27–52.