

# 'The Second Machine Age,' by Erik Brynjolfsson and Andrew McAfee

Over the past year, there's been a lot of talk in economic circles about the prospect of stagnation. Because of demographics, globalization, long-term global imbalances and a slowdown in technological innovation, the argument goes, advanced economies are trapped in an extended period of slow growth in productivity, income and job creation. Recent proponents of this hypothesis include economists Robert Gordon of Northwestern University and Michael Spence of New York University; former Treasury secretary Lawrence Summers; and Tyler Cowen, my colleague at George Mason University, in his latest book, "[Average Is Over](#)."

Now come two professors from MIT with a more optimistic and intriguing hypothesis — namely, that the global economy is on the cusp of a dramatic growth spurt driven by smart machines that finally take full advantage of advances in computer processing, artificial intelligence, networked communication and the digitization of just about everything.

"[The Second Machine Age](#)" is largely a reprise of an e-book, "Race Against the Machine," that Erik Brynjolfsson and Andrew McAfee self-published two years ago. It builds on their work at MIT's Center for Digital Business, along with that of "new growth" theorists such as Paul Romer, Brian Arthur and Martin Weitzman. And while Brynjolfsson and McAfee's policy prescriptions reflect the somewhat self-referential outlook that you run across in technology enclaves such as Silicon Valley and Cambridge, their book offers a timely antidote to the economic pessimism that has taken root in the aftermath of the financial crisis.

Brynjolfsson's and McAfee's optimism springs from the idea of exponential growth — in the computing power of machines, in the amount of digital information that is being created and in the number of relatively cheap devices that are continually talking to each other. When these numbers doubled every year or two in the early days of the computer

revolution, the results, while impressive, were still within our ability to imagine. But now that the numbers are so staggeringly large, the authors argue that machines can finally do things once considered possible only in the realm of science fiction.

It's not just that machines can now beat humans in chess or on "Jeopardy." It's that when they are combined with thousands of cheap sensors and huge databases, they can drive your car up and down a highway in safety and find the best way to get you where you want to go — not only because every road map has been scanned into the database, but also because every cellphone transmitting from every car will reveal where the traffic jams are. It's that robots can now scan and identify all the objects in a strange room, allowing them to perform a series of complex physical tasks. It's that a computer can translate from one language to any other, not because it has learned to speak them but because it recognizes patterns based on everything that's been written in a language so far. Computers can not only read and grade essays, they can write them.

What enables these breakthroughs, Brynjolfsson and McAfee argue, is not just the amount of data available and the speed at which it can be processed. It's also the ease with which these new capabilities and new ideas can be combined and recombined. Economic historians tell us that it took several decades for earlier breakthrough technologies, such as the steam engine or electricity, to reach the point of ubiquity and flexible application at which they fundamentally changed the way people lived and businesses operated. Information technology and digital communication, they argue, are now just reaching that same inflection point. Rather than approaching a period of mature decline, as Gordon and Cowen have suggested, according to the men from MIT, these technologies are about to take off.

The big winners in this new era will be consumers, who will be able to buy a wider range of higher-quality goods and services at lower prices. The other winners will be those who create and finance the new machines or figure out how best to use them to gain competitive advantage. Great wealth will be created in the process.

To illustrate the point, Brynjolfsson and McAfee cite the example of Instagram and

Kodak. Instagram is a simple app that has allowed more than 130 million people to share some 16 billion photos. Within 15 months of its founding, Instagram was sold to Facebook — a company with 1 billion users — for \$1 billion. It was only a few months later that Kodak, the Instagram of its day, declared bankruptcy. The authors use this little vignette to illustrate two points. The first is to point out that the market value of Facebook/Instagram is now several times the value of Eastman Kodak at its peak, creating, by their calculation, seven billionaires, each of whom has a net worth 10 times greater than George Eastman ever had. Such is the “bounty” of the second machine age.

But the evolution of photography also demonstrates how unevenly that bounty has been divided — what the authors somewhat inelegantly call the “spread.” Not only has it created a new class of super-rich entrepreneurs and investors, but it has done so with a company that employs only 4,600 workers. Compare that with Kodak, which at its peak employed 145,000 workers in mostly middle-class jobs.

In the first machine age — the age of Kodak — productivity, employment and median income all rose in tandem. In the second, the growth in productivity has essentially been decoupled from jobs and income. And this divergence has its roots not in labor law or tax codes, Brynjolfsson and McAfee argue, but in the very nature of the digital economy, in which a set of goods and services can be provided to an infinite number of additional customers, all at the same time, at a cost that is often close to zero.

Brynjolfsson and McAfee are hardly the first to come upon the idea that new technology can lead to higher unemployment and rising inequality. The British economist John Maynard Keynes coined the term “technological unemployment” back in the 1930s when he predicted that the displacement of workers by machines would usher in an era of shorter workweeks and increased leisure. And in the 1990s, economists Sherwin Rosen and Robert Frank saw that globalization and technology could conspire to create “superstar” or “winner take all” labor markets. Until now, the consensus among economists was that these developments would have only a minor or temporary impact on the economy. Now they are not so sure.

On the issue of jobs and job growth, Brynjolfsson and McAfee reject the Luddite fear that smart machines must inevitably reduce the overall demand for labor — jobs — arguing that the increased “bounty” that technology creates will simply shift demand to different kinds of work, as it always has. Yes, there will be fewer credit analysts and package handlers, but there will be greater demand for high-level programmers and special-needs teachers. The transition, they suggest, could be made smoother if our education system were reoriented from its industrial-era focus on math and reading to a broader set of personal and intellectual skills necessary for working alongside the smart new machines.

To deal with what they see as the inevitable increase in income inequality, the MIT duo would turn to a negative income tax, with which the government would assure a minimum income to anyone who works — an old idea now gaining popularity on both the left and the right.

For a Washington reader, the weakest parts of this book are its many other policy prescriptions, most of which are straight from the talking points that tech executives have been peddling for years on their visits to the capital. Individually, the policies are perfectly reasonable — so reasonable, in fact, that they raise the more important question of why they haven’t been adopted long ago. But unless the authors have some clever idea for ending the partisan and ideological tong war that now passes for the American political process, telling us to spend more on infrastructure, reform the immigration system and lower the cost of higher education isn’t really adding much to the conversation.

The strength of “The Second Machine Age” is how it weaves macro- and microeconomics with insights from a wide range of other disciplines into an accessible and convincing story. In some ways, Brynjolfsson and McAfee practice an older style of economics based more on logic, history and observation than on data and mathematical models. But in other ways, they are pioneering a fundamentally new economics, one based not on the old reality of scarcity but on a new reality of abundance that we are only just beginning

to comprehend.

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