# The Robots Are Here and More Are Coming: Do Not Blame Them for our Wage or Job Problems

The "robots are coming" narrative dominating discussions of the economy was popularized by Erik Brynjolfsson and Andrew McAfee in their 2011 book, *Race Against the Machine*. They have built on that theme in the richer, deeper *The Second Machine Age* (W.W. Norton, 2014). The first half of the book provides a valuable window, at least for a non-technologist like me, into past developments and the future trajectory of digitization. Their claim is that digitization will do for mental power what the steam engine did for muscle power—that is, quite a bit, transforming our lives at work and play.

The remainder of the book dwells on the role of digitization in generating both bounty (more consumer choice and greater output, wealth, and income) and spread (greater inequalities of wages, income, and wealth). In treating these topics, they heavily rely on the work of others. As in their last book, they do not provide much direct evidence of the connection between technological change and wage inequality. I study these issues and believe they are wrong to tightly link digitization and robots to wage inequality and the slow job growth of the 2000s. Although the authors claim "technology is certainly not the only force causing this rise in spreads, but it is one of the main ones" my fear is that this book, like their last one, will fuel the mistaken narrative that technology is responsible for our job and wage problems and that we are powerless to obtain more equitable growth.

Let me start where we agree and where I very much appreciate their argumentation. Brynjolfsson and McAfee are very clear that we are experiencing a dramatic growth in wage, income, and wealth inequality; that living standards have faltered for a significant share of the population; and that these are challenges that must be addressed. They rightly fear that current inequities will generate greater future inequity: They argue that current wealth solidifies and expands inequality through the political process and worry that inequality impedes social mobility—the degree to which a child's chances are linked to his or her parents' current station. Inequality begets greater inequality. I appreciate their refutation of denialism and 'so whatism'.

Their weakest case is that digitization is associated with the slow job growth of the last 15 years. The authors review all the reasons why economists find such a claim untrue, including 200 years of history disproving a link between technology and slow job growth. They propose a few reasons why things may be different now. However, their only evidence is that employment and productivity grew in tandem for many decades but became decoupled in the late 1990s and offer their "reading of technology" as an explanation. In fact, there's a simple answer to the riddle of slow job growth: slow economic growth resulting from the collapse of two asset bubbles and inadequate policy responses. Job growth occurs when economic growth exceeds productivity. Simply put, if workers can produce 2 percent more this year than last year, the economy can grow 2 percent without adding any employment. Thus, the economy must grow faster than productivity to create jobs, something that has not happened in the unique circumstances of the 2000s.

On wage inequality, the authors offer "skill-biased technical change" or SBTC as the explanation. In fact, they offer two distinct SBTC narratives, both of which cannot be simultaneously true and neither of which aptly explains wage trends.

In general, SBTC narratives are weak because they cannot explain one of the key inequality trends, the remarkable wage and income growth of the top 1.0 and 0.1 percent. The authors get around that by offering up a different explanation for growth at the top—the superstar theory. Under this theory, technology has created larger markets where one winner can "take it all," and technology allows executives to monitor many more employees. But research with my colleague Josh Bivens shows that rising executive pay and the expansion of, and better pay in, the financial sector can account for two-thirds of increased incomes at the top. If superstar actors, musicians, and others were driving growth at the top we wouldn't see the close association of top incomes with the trajectory of the stock market, especially during the last two crashes. The two are related because executives receive stock options and financial employees receive bonuses. On their specific claim about executive pay it is true that such

pay grew as firm size grew in the last two decades but it is also true that firm size grew for many decades before that without any escalation of executive pay.

Specifically, the authors' first SBTC narrative, the "race between technology and skills," falls short because it doesn't square with recent trends. Under this narrative, technological change makes employers value education more, and the more education or skills one has, the better one fares. Despite the absence of prima facie evidence for this popular narrative for two decades, it barrels along anyway. For instance, the wage gap between middle and low-wage workers has been stable or falling since 1987 or so, meaning that those with the least skills have done at least as well or better than those in the middle. Moreover, the much touted wage gap between college-educated workers and others has hardly grown since 1995 (up 5 percentage points) while it grew three times more in the preceding 16 years. This implies, given steady growth of college graduates, that the demand for college graduates has grown far more slowly during the age of digitization. The small increase in education wage gaps since 1995 have clearly not driven the growing wage inequality between high-wage and middle-wage workers, which has grown at a far faster pace. The 2000s, and not just the great recession, has been especially unkind to this narrative: college wages have been flat for the last 10 years, underemployment (taking jobs not requiring a degree) among college graduates has grown, and many graduates are working for free as interns—a clear sign that there's no shortage.

The second narrative is that technology is eroding jobs and wages in middle-wage occupations but expanding opportunities and wages among low- and high-wage occupations. This "job polarization" narrative, which emerged around 2006, was designed to overcome the flaw in the education narrative's explanation of wage trends in the 1990s, when low-wage workers fared as well or better than middle-wage workers. The accumulating evidence now shows that job polarization has not occurred in the entire 2000s: Employment in occupations in the upper half of the wage scale has not grown faster than employment in the bottom half. This is confirmed by direct analysis (Figure 3 in a recent Third Way report) of occupations using non-routine, abstract reasoning: These supposed winners from digitization did not see employment expansion between 2000 and 2006 or from 2006 to 2009. Moreover, there is no strong link between the pace of employment growth and wage growth in an occupation, leaving occupation employment trends unable to explain wage inequality. Even those in science, technology, engineering, and math (STEM) have seen their wages stagnate in the 2000s, and wages have also stagnated in business and management occupations.

So, again, these two SBTC narratives can't both be true—either middle-wage workers are doing better than low-wage workers or they're not. And neither one can explain the trends of the 2000s, the period where one would expect digitization's impact to be most evident. The robots are here and more will be coming but they are not responsible for our employment or our wage problems. Read the first half of the book to learn about technology but take the second half with a grain of salt. For understanding wage inequality you should look elsewhere.