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AARON BENANAV

AUTOMATION AND THE FUTURE OF WORK—I

THE WORLD IS abuzz with talk of automation. Rapid advances in artificial intelligence, machine learning and robotics seem set to transform the world of work. In the most advanced factories, companies like Tesla have been aiming for ‘lights-out’ production, in which fully automated work processes, no longer needing human hands, can run in the dark. Meanwhile, in the illuminated halls of robotics conventions, machines are on display that can play ping-pong, cook food, have sex and even hold conversations. Computers are not only developing new strategies for playing Go, but are said to be writing symphonies that bring audiences to tears. Dressed in white lab coats or donning virtual suits, computers are learning to identify cancers and will soon be developing legal strategies. Trucks are already barreling across the US without drivers; robotic dogs are carrying military-grade weapons across desolate plains. Are we living in the last days of human toil? Is what Edward Bellamy once called the ‘edict of Eden’ about to be revoked, as ‘men’—or at least, the wealthiest among them—become like gods?¹

There are many reasons to doubt the hype. For one thing, machines remain comically incapable of opening doors or, alas, folding laundry. Robotic security guards are toppling into mall fountains. Computerized digital assistants can answer questions and translate documents, but not well enough to do the job without human intervention; the same is true of self-driving cars.² In the midst of the American ‘Fight for Fifteen’ movement, billboards went up in San Francisco threatening to replace fast-food workers with touchscreens if a law raising the minimum wage were passed. The *Wall Street Journal* dubbed the bill the ‘robot employment act’. Yet many fast-food workers in Europe already work alongside

touchscreens and often earn better pay than in the US.³ Is the talk of automation overdone?

I. THE AUTOMATION DISCOURSE

In the pages of newspapers and popular magazines, scare stories about automation may remain just idle chatter. However, over the past decade, this talk has crystalized into an influential social theory, which purports not only to analyse current technologies and predict their future, but also to explore the consequences of technological change for society at large. This automation discourse rests on four main propositions. First, workers are already being displaced by ever-more advanced machines, resulting in rising levels of ‘technological unemployment’. Second, this displacement is a sign that we are on the verge of achieving a largely automated society, in which nearly all work will be performed by self-moving machines and intelligent computers. Third: automation should entail humanity’s collective liberation from toil, but because we live in a society where most people must work in order to live, this dream may well turn out to be a nightmare.⁴ Fourth, therefore, the only way to prevent a mass-unemployment catastrophe is to provide a universal basic income (UBI), breaking the connection between the incomes people earn and the work they do, as a way to inaugurate a new society.

This argument has been put forward by a number of self-described futurists. In the widely read *Second Machine Age* (2014), Erik Brynjolfsson and Andrew McAfee argue that we find ourselves ‘at an inflection point—a bend in the curve where many technologies that used to be found only in science fiction are becoming everyday reality.’ New technologies

¹ See Edward Bellamy’s utopia, *Looking Backward, 2000–1887*, Oxford 2007 [1888], p. 68.

² See, respectively, Daniela Hernandez, ‘How to Survive a Robot Apocalypse: Just Close the Door’, *Wall Street Journal*, 10 November 2017; David Autor, ‘Why Are There Still So Many Jobs? The History and Future of Workplace Automation’, *Journal of Economic Perspectives*, vol. 29, no. 3, 2015, pp. 25–6.

³ Andy Puzder, ‘The Minimum Wage Should Be Called the Robot Employment Act’, *WSJ*, 3 April 2017, Françoise Carré and Chris Tilly, *Where Bad Jobs Are Better*, New York 2017.

⁴ This position is distinct from that of techno-optimists, like Ray Kurzweil, who imagine that technological change will generate a utopian world by itself, without the need for social transformation.

promise an enormous ‘bounty’, but Brynjolfsson and McAfee caution that ‘there is no economic law that says that all workers, or even a majority of workers, will benefit from these advances.’ On the contrary: as the demand for labour falls with the adoption of more advanced technologies, wages are stagnating; a rising share of annual income is therefore being captured by capital rather than by labour. The result is growing inequality, which could ‘slow our journey’ into what they call ‘the second machine age’ by generating a ‘failure mode of capitalism’ in which rentier extraction crowds out technological innovation.⁵ In *Rise of the Robots* (2015), Martin Ford similarly claims that we are pushing ‘towards a tipping point’ that is poised to ‘make the entire economy less labour-intensive.’ Again, ‘the most frightening long-term scenario of all might be if the global economic system eventually manages to adapt to the new reality’, leading to the creation of an ‘automated feudalism’ in which the ‘peasants would be largely superfluous’ and the elite impervious to economic demands.⁶ For these authors, education and retraining will not be enough to stabilize the demand for labour in an automated economy; some form of guaranteed non-wage income, such as a negative income tax, must be put in place.⁷

The automation discourse has been enthusiastically adopted by the jeans-wearing elite of Silicon Valley. Bill Gates is advocating for a tax on robots. Mark Zuckerberg told Harvard undergraduate inductees that they should ‘explore ideas like universal basic income’, a policy Elon Musk also thinks will become increasingly ‘necessary’ over time, as robots outcompete humans across a growing range of jobs.⁸ Musk has been naming his SpaceX drone vessels after spaceships from Iain M. Banks’s *Culture Series*, a set of ambiguously utopian science-fiction novels depicting a post-scarcity world in which human beings live fulfilling lives alongside intelligent robots, called ‘minds’, without the need for markets or states.⁹

⁵ Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, London 2014, pp. 34, 128, 134ff, 172, 232.

⁶ Martin Ford, *Rise of the Robots: Technology and the Threat of a Jobless Future*, New York 2015, pp. xvii, 219.

⁷ See Ford, *Rise of the Robots*, pp. 257–61.

⁸ Andy Kessler, ‘Zuckerberg’s Opiate For the Masses’, *WSJ*, 18 June 2017.

⁹ See for example Iain M. Banks, *Look to Windward*, London 2000, as well as his ‘Notes on the Culture’, collected in Banks, *State of the Art*, San Francisco 2004.

Politicians and their advisors have equally identified with the automation discourse, which has become one of the leading perspectives on our ‘digital future’. In his farewell presidential address, Obama suggested that the ‘next wave of economic dislocations’ will come not from overseas trade, but rather from ‘the relentless pace of automation that makes a lot of good, middle-class jobs obsolete.’ Robert Reich, former Labour Secretary under Bill Clinton, expressed similar fears: we will soon reach a point ‘where technology is displacing so many jobs, not just menial jobs but also professional jobs, that we’re going to have to take seriously the notion of a universal basic income.’ Clinton’s former Treasury Secretary, Lawrence Summers, made the same admission: once-‘stupid’ ideas about technological unemployment now seem increasingly smart, he said, as workers’ wages stagnate and economic inequality rises. The discourse has become the basis of a long-shot presidential campaign for 2020: Andrew Yang, Obama’s former ‘Ambassador of Global Entrepreneurship’, has penned his own tome on automation, *The War on Normal People*, and is now running a futuristic campaign on a ‘Humanity First’, UBI platform. Among Yang’s vocal supporters is Andy Stern, former head of the SEIU, whose *Raising the Floor* is yet another example of the discourse.¹⁰

Yang and Stern—like all of the other writers named so far—take pains to assure readers that some variant of capitalism is here to stay, even if it must jettison its labour markets; however, they admit to the influence of figures on the far left who offer a more radical version of the automation discourse. In *Inventing the Future*, Nick Srnicek and Alex Williams argue that the ‘most recent wave of automation is poised’ to transform the labour market ‘drastically, as it comes to encompass every aspect of the economy’.¹¹ They claim that only a socialist government would actually be able to fulfil the promise of full automation by creating a post-work or post-scarcity society. In *Four Futures*, Peter Frase

¹⁰ See, respectively, Claire Cain Miller, ‘A Darker Theme in Obama’s Farewell: Automation Can Divide Us’, *NYT*, 12 January 2017; Kessler, ‘Zuckerberg’s Opiate for the Masses’; Eduardo Porter, ‘Jobs Threatened by Machines: A Once “Stupid” Concern Gains Respect’, *NYT*, 7 June 2016; Kevin Roose, ‘His 2020 Campaign Message: The Robots Are Coming’, *NYT*, 12 February 2018; Andrew Yang, *The War on Normal People: The Truth About America’s Disappearing Jobs and Why Universal Basic Income Is Our Future*, New York 2018; Andy Stern, *Raising the Floor: How a Universal Basic Income Can Renew Our Economy and Rebuild the American Dream*, New York 2016.

¹¹ Nick Srnicek and Alex Williams, *Inventing the Future: Postcapitalism and a World Without Work*, London and New York 2015, p. 112.

thoughtfully explores the alternative outcomes for such a post-scarcity society, depending on whether it still had private property and still suffered from resource scarcity, which could persist even if labour scarcity were overcome.¹² Like the liberal proponents of the automation discourse, these left-wing writers stress that, even if the coming of advanced robotics is inevitable, ‘there is no necessary progression into a post-work world’.¹³ Srnicek, Williams and Frase are all proponents of UBI, but in a left-wing variant. For them, UBI serves as a bridge to ‘fully automated luxury communism’, a term originally coined in 2014 by Aaron Bastani to name a possible goal of socialist politics, and which flourished for five years as a meme on the internet before his book—outlining an automated future in which artificial intelligence, solar power, gene-editing, asteroid mining and lab-grown meat generate a world of limitless leisure and self-invention—finally appeared.¹⁴

Recurrent fears

These futurist visions, from all points of the political spectrum, depend upon a common prediction of the trajectory of technological change. Have they got this right? To answer this question, it is helpful to have a couple of working definitions. Automation may be distinguished as a specific form of labour-saving technical innovation: automation technologies fully substitute for human labour, rather than merely augmenting human-productive capacities. With labour-augmenting technologies, a given job category will continue to exist, but each worker in that category will be more productive. For example, adding new machines to an assembly-line producing cars may make line workers more productive without abolishing line work as such. However, fewer workers will be needed in total to produce any given number of automobiles. Whether that results in fewer jobs will then depend on how much output—the total number of cars—also increases.

By contrast, automation may be defined as what Kurt Vonnegut describes in *Player Piano*: it takes place whenever an entire ‘job classification has been eliminated. Poof.’ No matter how much production might increase, another telephone-switchboard operator or hand-manipulator of rolled

¹² Peter Frase, *Four Futures: Life After Capitalism*, London and New York 2016; Manu Saadia, *Treconomics: The Economics of Star Trek*, San Francisco 2016.

¹³ Srnicek and Williams, *Inventing the Future*, p. 127.

¹⁴ Aaron Bastani, *Fully Automated Luxury Communism: A Manifesto*, London and New York 2019.

steel will never be hired. In these cases, machines have fully substituted for human labour. Much of the debate around the future of workplace automation turns on an evaluation of the degree to which present or near-future technologies are labour-substituting or labour-augmenting in character. Distinguishing between these two types of technical change turns out to be incredibly difficult in practice. One famous study from the Oxford Martin School suggested that 47 per cent of jobs in the US are at high risk of automation; a more recent study from the OECD predicts that 14 per cent of OECD jobs are at high risk, with another 32 per cent at risk of significant change in the way they are carried out (due to labour-augmenting rather than substituting innovations).¹⁵

It is unclear, however, whether even the highest of these estimates suggests that a qualitative break with the past has taken place. By one count, '57 per cent of the jobs workers did in the 1960s no longer exist today'.¹⁶ Automation, in fact, turns out to be a constant feature of the history of capitalism. By contrast, the discourse around automation, which extrapolates from instances of technological change to a broader social theory, is not constant; it periodically recurs in modern history. Excitement about a coming age of automation can be traced back to at least the mid-19th century. Charles Babbage published *On the Economy of Machinery and Manufactures* in 1832; John Adolphus Etzler's *The Paradise Within the Reach of All Men, Without Labour* appeared in 1833, Andrew Ure's *The Philosophy of Manufactures* in 1835. These books presaged the imminent emergence of largely or fully automated factories, run with minimal or merely supervisory human labour. This vision was a major influence on Marx, whose *Capital, Volume One* argued that a complex world of interacting machines was in the process of displacing labour at the centre of economic life.

Visions of automated factories then appeared again in the 1930s, 1950s and 1980s, before their re-emergence in the 2010s. Each time, they

¹⁵ Carl Frey and Michael Osborne originally released their study as an Oxford Martin working paper online in 2013; it was later published as 'The Future of Employment: How Susceptible Are Jobs to Computerization?', *Technological Forecasting and Social Change*, vol. 114, January 2017; Ljubica Nedelkoska and Glenda Quintini, 'Automation, Skills Use and Training', *OECD Social, Employment and Migration Working Papers*, no. 202, 2018.

¹⁶ Quoted in Jerry Kaplan, 'Don't Fear the Robots', *WSJ*, 21 July 2017. See also Robert Atkinson and John Wu, 'False Alarmism: Technological Disruption and the US Labor Market, 1850–2015', Information Technology and Innovation Foundation, 2017.

were accompanied or shortly followed by predictions of a coming age of ‘catastrophic unemployment and social breakdown’, which could be prevented only if society were reorganized.¹⁷ To point out the periodicity of this discourse is not to say that its accompanying social visions should be dismissed. For one thing, the technological breakthroughs presaged by automation discourse could still be achieved at any time: just because they were wrong in the past does not necessarily mean that they will always be wrong in the future. More than that, these visions of automation have clearly been generative in social terms: they point to certain utopian possibilities latent within modern capitalist societies. The error in their approach is merely to suppose that, via ongoing technological shifts, these utopian possibilities will imminently be revealed via a catastrophe of mass unemployment.

The basic insight on which automation theory relies was described, most succinctly, by the Harvard economist Wassily Leontief. He pointed out that the ‘effective operation of the automatic price mechanism’ at the core of capitalist societies ‘depends critically’ on a peculiar feature of modern technology, namely that in spite of bringing about ‘an unprecedented rise in total output’, it nevertheless ‘strengthened the dominant role of human labour in most kinds of productive processes’.¹⁸ At any time, a breakthrough could destroy this fragile pin, annihilating the social preconditions of functioning market economies. Drawing on this insight—and adding only that such a technological breakthrough now exists—the automation prognosticators often argue that capitalism must be a transitory mode of production, which will eventually give way to a new form of life that does not organize itself around work for wages and monetary exchange.¹⁹

Taking its periodicity into account, automation theory may be described as a spontaneous discourse of capitalist societies, which, for a mixture of structural and contingent reasons, reappears in those societies time

¹⁷ Amy Sue Bix, *Inventing Ourselves Out of Jobs: America’s Debate Over Technological Unemployment, 1929–1981*, Baltimore 2000, pp. 305–7. See also Jason Smith, ‘Nowhere to Go: Automation, Then and Now’, *Brooklyn Rail*, March–April 2017.

¹⁸ Wassily Leontief, ‘Technological Advance, Economic Growth, and the Distribution of Income’, *Population and Development Review*, vol. 9, no. 3, 1983, p. 404.

¹⁹ Keynes had a similar reaction to his own discovery that no mechanism in capitalist economies automatically generates full employment. See his ‘Economic Possibilities for Our Grandchildren (1930)’, in *Essays in Persuasion*, New York 1932. See also William Beveridge, *Full Employment in a Free Society*, London 1944, especially pp. 21–3.

and again as a way of thinking through their limits. What summons the automation discourse periodically into being is a deep anxiety about the functioning of the labour market: there are simply too few jobs for too many people. Proponents of the automation discourse consistently explain the problem of a low demand for labour in terms of runaway technological change.

Declining labour demand

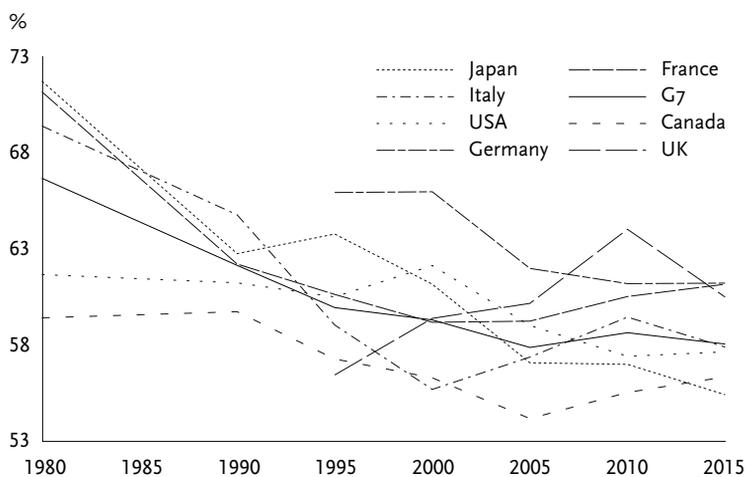
If automation discourse appeals so widely again today, it is because, whatever their causes, the ascribed consequences of automation are all around us: global capitalism clearly *is* failing to provide jobs for many of the people who need them. There is, in other words, a persistently low demand for labour, reflected not only in higher spikes of unemployment and increasingly jobless recoveries—both frequently cited by automation theorists—but also in a phenomenon with more generic consequences: declining labour shares of income. Many studies have now confirmed that the labour share, whose steadiness was held to be a stylized fact of economic growth, has been falling for decades (Figure 1).

These shifts signal a radical decline in workers' bargaining power. Realities for the typical worker are worse than these statistics suggest, since wage growth has become increasingly skewed towards the highest earners: the infamous top one per cent. A growing gap has opened up not only between the growth of labour productivity and average wage-incomes, but also between the growth of average wages and that of median wages, with the result that many workers see a vanishingly thin slice of economic growth (Figure 2).²⁰ Under these conditions, rising inequality is contained only by the strength of redistributive programmes. Even critics of automation discourse such as David Autor and Robert Gordon are disturbed by these trends: something has gone wrong with the economy, leading to a low demand for labour.²¹

²⁰ See Josh Bivens and Lawrence Mishel, 'Understanding the Historic Divergence Between Productivity and a Typical Worker's Pay', EPI Briefing Paper 406, September 2015; Paolo Pasimeni, 'The Relation Between Productivity and Compensation in Europe', European Commission Discussion Paper 79, March 2018.

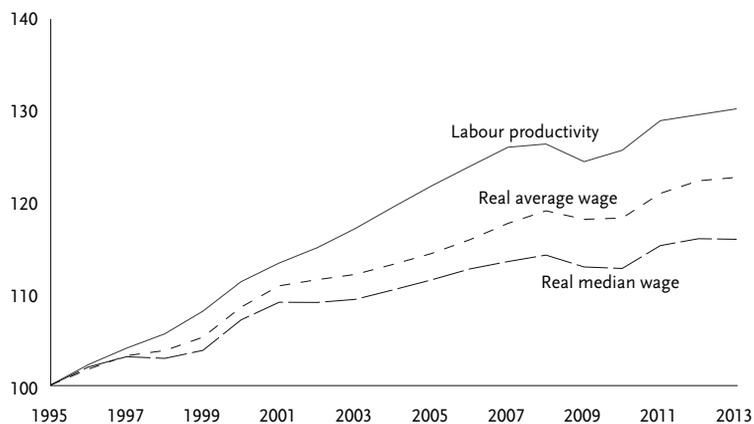
²¹ See David Autor, ed., 'Paradox of Abundance: Automation Anxiety Returns' in Subramanian Rangan, *Performance and Progress: Essays on Capitalism, Business and Society*, Oxford 2015, p. 257; Robert Gordon, *Rise and Fall of American Growth*, Princeton 2016, p. 604.

FIGURE I: *Labour Share of Income, G7 Economies, 1980–2015*



Source: OECD Compendium of Productivity Indicators, 2017, Chapter 1, Figure 1.8.

FIGURE 2: *Productivity-Wages Gap, OECD Countries, 1995–2013*



Note: 1995=100. Source: OECD Economic Outlook, Volume 2018, Issue 2, Chapter 2, Figure 2.2. Employment weighted average of 24 countries, including Finland, Germany, Japan, Korea, United States, France, Italy, Sweden, Austria, Belgium, UK, Australia, Spain, Czechia, Denmark, Hungary, Poland, Netherlands, Norway, Canada, New Zealand, Ireland, Israel and Slovakia. For detailed information, see the OECD Economic Outlook.

Is automation the cause of the low demand for labour? I will join the critics of automation discourse in arguing that it is not. However, along the way, I will also criticize the critics—both for producing explanations of low labour demand that only apply in high-income countries and for failing to produce anything like a radical vision of social change that is adequate to the scale of the problems we now confront. Indeed, it should be said from the outset that I am more sympathetic to the left automation theorists than to their critics.

Even if the explanation they offer turns out to be inadequate, the automation theorists have at least focused the world's attention on the problem of a persistently low demand for labour. They have also excelled in actually trying to imagine solutions to this problem that are broadly emancipatory in character. In Jameson's terms, the automation theorists are our late capitalist utopians.²² In a world reeling from the 'perfect storm' of climate change, rising inequality, recalcitrant neoliberalism and resurgent ethno-nationalism, the automation theorists are the ones pushing through the catastrophe with a vision of an emancipated future, in which humanity advances to the next stage in our history, whatever that might mean (or whatever we want to make it mean), and technology helps to free us all to discover and follow our passions. That is true in spite of the fact that—like many of the utopians of the past—the actual visions these latest utopians offer need to be freed from their largely technocratic fantasies of how social change to a better future might take place.

Major shifts in the forms of government intervention in the economy are adopted only under massive social pressure, such as, in the course of the 20th century, the threat of communism or of civilizational collapse. Today, policy reforms could emerge in response to pressure coming from a new mass movement, aiming to change the basic makeup of the social order. Instead of fearing that movement, we should see ourselves as part of it, helping articulate its goals and paths forward. If that movement is defeated, maybe the best we will get is basic income, but that should not be our goal. We should be reaching towards a post-scarcity world, which advanced technologies will certainly help us realize, even if full automation is not achievable—or even desirable.

²² See Fredric Jameson, *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions*, London and New York 2005.

The return of automation discourse is a symptom of our era, as it was in times past: it arises when the global economy's failure to create enough jobs causes people to question its fundamental viability. The breakdown of this market mechanism today is more extreme than at any time in the past. This is because a greater share of the world's population than ever before depends on selling its labour or the simple products of its labour to survive, in the context of weakening global economic growth. Our present reality is better described by near-future science-fiction dystopias than by standard economic analysis; ours is a hot planet, with microdrones flying over the heads of the street hawkers and rickshaw pullers, where the rich live in guarded, climate-controlled communities while the rest of us wile away our time in dead-end jobs, playing video games on smartphones. We need to slip out of this timeline and into another.

Reaching towards a post-scarcity world—in which all individuals are guaranteed access to whatever they need to make a life, without exception—can become the basis on which humanity mounts a battle against climate change. It can also be the foundation on which we remake the world, creating the conditions in which, as James Boggs once put it, 'for the first time in human history, great masses of people will be free to explore and reflect, to question and to create, to learn and to teach, unhampered by the fear of where the next meal is coming from'.²³ Finding our way forward requires a break between work and income, as the automation theorists recognize, but also between profit and income, as many do not.

In responding to the automation discourse, then, I will argue that the decline in the demand for labour is due not to an unprecedented leap in technological innovation, but to ongoing technical change in an environment of deepening *economic stagnation*. In the second part of this contribution, to be published in *NLR* 120, I contend that this fall in labour demand manifests not as mass unemployment, but rather as mass *under*-employment, not necessarily a problem for the elites. On this basis, I mount a critique of technocratic solutions, like basic income. I offer a thought-experiment of how we might imagine a post-scarcity society that centres on humans, not machines, and project a path of how we might get there through social struggle, rather than administrative intervention. But first, in Part One, I provide a diagnosis of the

²³ James Boggs, 'Manifesto for a Black Revolutionary Party', in Stephen Ward, ed., *Pages from a Black Radical's Notebook: A James Boggs Reader*, Detroit 2011, p. 219.

underlying causes of the decline in demand for labour. This involves a detour to consider the fortunes of the global manufacturing sector and the competitive dynamics at work in labour's 'deindustrialization'.

2. LABOUR'S GLOBAL DEINDUSTRIALIZATION

Automation-discourse theorists recognize that, if technologically induced job-destruction is to have widespread social ramifications, it will have to eliminate employment in the vast and variegated service sector, which absorbs 74 per cent of workers in high-income countries and 52 per cent worldwide.²⁴ They therefore focus on 'new forms of service-sector automation' in retail, transportation and food services, where 'robotization' is said to be 'gathering steam' with a growing army of machines that take orders, stock shelves, drive cars and flip burgers. Many more service-sector jobs, including some that require years of education and training, will supposedly be rendered obsolete in the coming years due to advances in artificial intelligence.²⁵ Of course, these claims are mostly predictions about the effects that technologies will have on future patterns of employment. Such predictions can go wrong—as for example when Eatsa, an automated fast-food company which employed neither cashiers nor waiters, was forced to close most of its stores in 2017.²⁶

In making their case, automation theorists often point to the manufacturing sector as the precedent for what they imagine is beginning to happen in services—for in manufacturing, the employment-apocalypse has already taken place.²⁷ To evaluate the theorists' claims, it therefore makes sense to begin by looking at what role automation has played in

²⁴ World Bank, *World Development Indicators*. Within the global economy, many of these service workers are employed informally, earning incomes by picking through trash, or selling food out of pushcarts, in the sort of jobs that could already have been eliminated with 20th century technologies: supermarkets, big-box retailers, refrigerated trucking, etc.

²⁵ Nick Dyer-Witheford, *Cyber-Proletariat: Global Labour in the Digital Vortex*, London 2015, p. 184. Routine intellectual activities, even highly skilled ones, are apparently proving easier to automate than non-routine manual jobs, which require more dexterity than machines presently possess. Brynjolfsson and McAfee, *Second Machine Age*, pp. 28–9.

²⁶ Tim Carman, 'This Automated Restaurant Was Supposed to Be the Future of Dining. Until Humanity Struck Back', *Washington Post*, 24 October 2017.

²⁷ See for example, Brynjolfsson and McAfee, *Second Machine Age*, pp. 30–1; Ford, *Rise of the Robots*, pp. 1–12.

that sector's fate. After all, manufacturing is the area most amenable to automation, since on the shop floor it is possible to 'radically simplify the environment in which machines work, to enable autonomous operation'.²⁸ Industrial robotics has been around for a long time: the first robot, the 'unimate', was installed in a General Motors plant in 1961. Still, until the 1960s, scholars studying this sector were able to dismiss Luddite fears of long-term technological unemployment out of hand. Manufacturing employment in fact *grew* most rapidly in those lines where technical innovation was happening at the fastest pace, because it was in those lines that prices fell the fastest, stoking the growth of demand for the products.²⁹

Industrialization has long since given way to deindustrialization, and not just in any one line but across the manufacturing sectors of most countries.³⁰ The share of workers employed in manufacturing fell first across the high-income world: manufacturing employed 22 per cent of all workers in the US in 1970; that share declined to just 8 per cent in 2017. Over the same period, manufacturing employment shares fell from 23 per cent to 9 per cent in France, and from 30 per cent to 8 per cent in the UK. Japan, Germany and Italy have experienced smaller but still substantial declines: in Japan from 25 per cent to 15 per cent, in Germany from 29 per cent to 17 per cent, and in Italy from 25 per cent to 15 per cent. In all cases, the declines were eventually associated with substantial falls in the total number of people employed in manufacturing. In the US, Germany, Italy and Japan, the overall number of manufacturing jobs fell by approximately a third from postwar peaks; in France, by 50 per cent and in the UK, by 67 per cent.³¹

It is commonly assumed that deindustrialization must be the result of production facilities moving offshore. Yet in none of the countries

²⁸ Autor, 'Why Are There Still So Many Jobs?', p. 23.

²⁹ Eileen Appelbaum and Ronald Schettkat, 'Employment and Productivity in Industrialized Economies', *International Labour Review*, vol. 134, no. 4–5, 1995, pp. 607–9.

³⁰ Unless otherwise noted, statistics in the rest of this section are drawn from Conference Board, 'International Comparisons of Manufacturing Productivity and Unit Labour Cost', last updated July 2018, and 'Total Economy Database', last updated November 2018.

³¹ Note that manufacturing is one part of the larger industrial sector, which typically includes mining, construction and utilities, and which has also seen declining employment shares, mostly but not exclusively due to job loss in manufacturing.

named above has manufacturing job loss been associated with declines in manufacturing output. Real value added in manufacturing more than doubled in the US, France, Germany, Japan and Italy between 1970 and 2017. Even the UK, whose manufacturing sector fared worst of all among this group, saw a 25 per cent increase in manufacturing real value added over this period. To be sure, low- and middle-income countries are producing more and more goods for import into high-income countries; however, deindustrialization in the latter cannot simply be the result of productive capacity moving to the former. In the scholarly literature, deindustrialization is therefore ‘most commonly defined as a decline in the share of manufacturing in total employment’, regardless of corresponding trends in levels of manufactured output.³² This definition moves in step with automation theorists’ core expectations: more goods are being produced but by fewer workers.

It is on this basis that commentators typically cite rapidly rising labour productivity, rather than an influx of low-cost imports from abroad, as the primary cause of industrial-job loss in advanced economies.³³ On closer inspection, however, this explanation turns out to be inadequate: no upward leap has taken place in manufacturing productivity levels.³⁴ On the contrary, manufacturing productivity has been growing at a sluggish pace for decades, leading Robert Solow to quip, ‘We see the computer age everywhere, except in the productivity statistics.’³⁵ Automation theorists discuss this ‘productivity paradox’ as a problem for their account—explaining it in terms of weak demand for products, or the persistent availability of low-wage workers—but they understate its true significance. This is partly due to the appearance of steady labour-productivity growth in US manufacturing, at an average rate of around

³² Fiona Tregenna, ‘Characterizing Deindustrialization: An Analysis of Changes in Manufacturing Employment and Output Internationally’, *Cambridge Journal of Economics*, vol. 33, no. 3, 2009, p. 433.

³³ In the scholarly literature, see for example Robert Rowthorn and Ramana Ramaswamy’s oft cited paper, ‘Deindustrialization: Causes and Implications’, IMF Working Paper 97/42, 1997. In the press, see Eduardo Porter, ‘Is the Populist Revolt Over? Not if Robots Have Their Way’, *NYT*, 30 January 2018.

³⁴ The intuition here is that if automation were taking place, the manufacturing sector would paradoxically see rapidly rising levels of labour productivity, even as more and more workers were actually being expelled from the production process: output per worker would soar, making it seem as if the people who still had jobs were working at an incredibly efficient pace.

³⁵ Quoted in Brynjolfsson and McAfee, *Second Machine Age*, p. 100.

3 per cent per year since 1950. On that basis, Brynjolfsson and McAfee suggest, automation could show up in the compounding effects of exponential growth, rather than an uptick in the growth rate.³⁶

However, official US manufacturing growth-rate statistics are over-inflated, for example in logging the production of computers with higher processing speeds as equivalent to the production of more computers.³⁷ On that basis, government statistics claim that productivity levels in the computers and electronics sub-sector rose at an average rate of over 10 per cent per year between 1987 and 2011, even as productivity growth rates outside of that sub-sector fell to around 2 per cent per year over the same period.³⁸ Since 2011, trends across the manufacturing sector have worsened: real output per hour in the sector as a whole was lower in 2017 than at its peak in 2010. Productivity growth rates in manufacturing collapsed precisely when they were supposed to be rising rapidly due to industrial automation.

Correcting manufacturing-productivity statistics in the US brings them more into line with trends visible in the statistics of other countries. In Germany and Japan, manufacturing-productivity growth rates have fallen dramatically since their postwar peaks. In Germany, for example, manufacturing productivity grew at an average annual rate of 6.3 per cent per year in the 1950s and 60s, falling to 2.4 per cent since 2000. This downward trend is to some extent an expected result of the end of an era of rapid, catch-up growth. However, it should still be surprising to the automation theorists, since Germany and Japan have raced ahead of the US in the field of industrial robotics. Indeed, the robots used in Tesla's largely automated car factory in California were made by a German robotics company.³⁹ German and Japanese firms deploy about

³⁶ Brynjolfsson and McAfee, *Second Machine Age*, pp. 43–5.

³⁷ See Martin Neil Baily and Barry P. Bosworth, 'US Manufacturing: Understanding Its Past and Its Potential Future', *Journal of Economic Perspectives*, vol. 28, no. 1, 2014; Daron Acemoglu et al, 'Return of the Solow Paradox? IT, Productivity, and Employment in US Manufacturing', *American Economic Review*, vol. 104, no. 5, 2014; and Susan Houseman, 'Understanding the Decline of US Manufacturing Employment', Upjohn Institute Working Paper 18–287, 2018.

³⁸ Baily and Bosworth, 'US Manufacturing', p. 9. Computers and electronics count for 10–15 per cent of US manufacturing output.

³⁹ Daniel Michaels, 'Foreign Robots Invade American Factory Floors', *WSJ*, 26 March 2017.

60 per cent more industrial robots per 10,000 manufacturing workers, compared to the US.⁴⁰

Yet deindustrialization continues to take place in all these countries, despite lacklustre manufacturing-productivity growth rates: that is, it is taking place as the automation theorists expect, but not for the reasons they offer. To explore the causes of deindustrialization in more detail, I use the following accounting identity. For any given industry, the rate of growth of output (ΔO) minus the rate of growth of labour productivity (ΔP) equals the rate of growth of employment (ΔE). Thus, $\Delta O - \Delta P = \Delta E$.⁴¹ So, for example, if the output of automobiles grows by 3 per cent per year, and productivity in the automobile industry grows by 2 per cent per year, then employment in that industry must necessarily rise by one per cent per year ($3 - 2 = 1$). Contrariwise, if output grows by 3 per cent per year and productivity grows by 4 per cent per year, employment will contract by 1 per cent per year ($3 - 4 = -1$).

Disaggregating manufacturing-output growth rates in France provides us with a sense of the typical pattern playing out across the high-income countries (Figure 3).⁴² During the so-called Golden Age of postwar capitalism, productivity growth rates in French manufacturing were much higher than they are today—5.2 per cent per year, on average, between 1950 and 1973—but output growth rates were even higher than that—5.9 per cent per year—as a result of a steady increase in employment of 0.7 per cent per year. Since 1973, both output and productivity rates have declined, but output rates fell much more sharply than productivity rates. By the early years of the 21st century, productivity growth rates—although much slower, at 2.7 per cent per year—were now faster than their corresponding output growth rates—at 0.9 per cent—as manufacturing employment contracted rapidly, by 1.7 per cent per year.

⁴⁰ The countries with the highest levels of installed industrial robots per 10,000 manufacturing employees in 2016 included South Korea (631), Singapore (488), Germany (309) and Japan (303), as compared to the United States (189) and China (68), according to the International Federation of Robotics, 'Robot Density Rises Globally', *IFR Press Releases*, 7 Feb 2018.

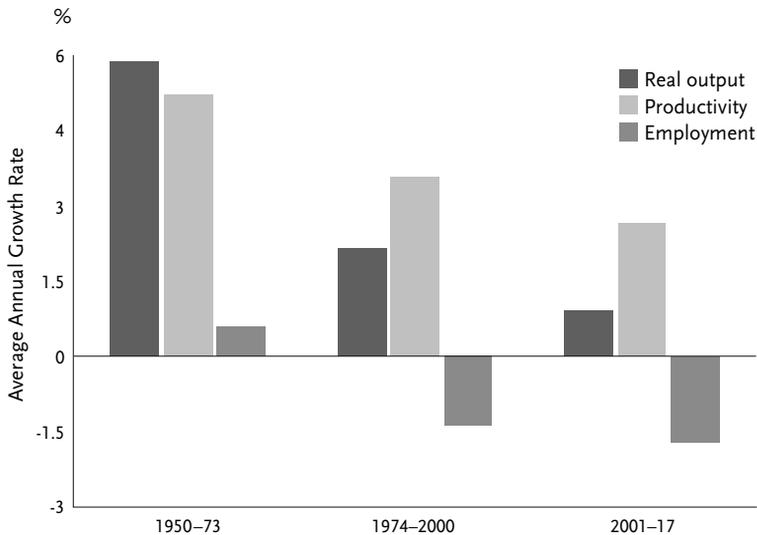
⁴¹ This equation excludes the so-called small term, $\Delta P \Delta E$, as insignificant. Note that because this equation is true according to the very definition of labour productivity (O/E), it cannot be used to establish relations of causality among the three terms, E , O and P .

⁴² It is worth noting, however, that job loss has been somewhat more severe in France compared to other European countries.

This disaggregation helps explain why automation theorists falsely perceive productivity to be growing at a rapid pace in manufacturing: in fact, productivity growth has been rapid only relative to extremely sluggish output growth. The same pattern can be seen in the statistics of other countries: no absolute decline in levels of manufacturing production has taken place, but there has been a decline in the output growth rate, with the result that output is growing more slowly than productivity (Table 1, overleaf). The simultaneity of limited technological dynamism and worsening economic stagnation combines to generate a progressive decline in industrial employment levels.

As such, ‘output-led’ deindustrialization is impossible to explain in purely technological terms.⁴³ In searching for alternative perspectives,

FIGURE 3: *French Manufacturing Sector, 1950–2017*



Source: Conference Board, *International Comparisons of Productivity and Unit Labour Costs*, July 2018 edition.

⁴³ José Gabriel Palma, ‘Four Sources of “Deindustrialization” and a New Concept of the “Dutch Disease”’, in José Antonio Ocampo, ed., *Beyond Reforms: Structural Dynamics and Macroeconomic Vulnerability*, New York 2005, pp. 79–81. See Rowthorn and Ramaswamy, ‘Deindustrialization: Causes and Implications’, p. 6, as well as Dani Rodrik, ‘Premature Deindustrialization’, *Journal of Economic Growth*, vol. 21, no. 1, 2016, p. 7.

economists have mostly preferred to describe it as a harmless evolutionary feature of advanced economies. However, that perspective is itself at a loss in explaining extreme variations in the GDP per capita levels at which this supposedly evolutionary economic shift has taken place. Deindustrialization unfolded first in high-income countries in the late 1960s and early 1970s, at the tail-end of a period in which levels of income per person had converged across the US, Europe and Japan. In the decades that followed, deindustrialization then spread ‘prematurely’ to middle- and low-income countries, with larger variations in incomes per capita (Figure 4).⁴⁴ In the late 1970s, deindustrialization arrived in southern Europe; much of Latin America, parts of East and Southeast

TABLE I: *Manufacturing Growth Rates, 1950–2017*

		<i>Output</i>	<i>Productivity</i>	<i>Employment</i>
USA	1950–73	4.4%	3.1%	1.2%
	1974–2000	3.1%	3.3%	-0.2%
	2001–17	1.2%	3.2%	-1.8%
Germany	1950–73	7.6%	5.7%	1.8%
	1974–2000	1.3%	2.5%	-1.1%
	2001–17	2.0%	2.2%	-0.2%
Japan	1950–73	14.9%	10.1%	4.3%
	1974–2000	2.8%	3.4%	-0.6%
	2001–17	1.7%	2.7%	-1.1%

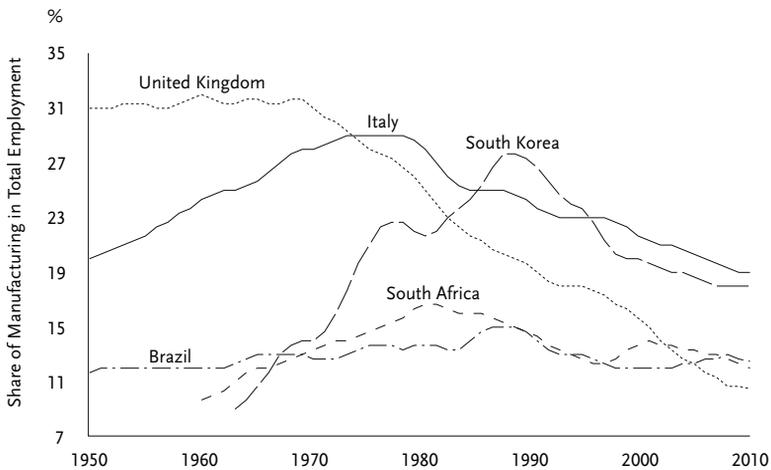
Source: Conference Board, *International Comparisons of Productivity and Unit Labour Costs*, July 2018 edition.

⁴⁴ For example, deindustrialization—as measured by the fall in the manufacturing share of employment—started in Brazil in 1986, when the country’s GDP per capita was \$12,100 (measured in 2017 US dollars at purchasing power parity), that is, a little more than half of the GDP per capita level of France at the time it began to deindustrialize, in 1973. South Africa, Indonesia and Egypt had even lower income levels at the time when their economies began to deindustrialize. See also Sukti Dasgupta and Ajit Singh, ‘Manufacturing, Services and Premature Deindustrialization in Developing Countries: A Kaldorian Analysis’, in George Mavrotas and Anthony Shorrocks, eds, *Advancing Development: Studies in Development Economics and Policy*, London 2007; and Tregenna, ‘Characterizing Deindustrialization’.

Asia, and southern Africa followed in the 1980s and 1990s. Peak industrialization levels in many poorer countries were so low that it may be more accurate to say that they never industrialized in the first place.⁴⁵

By the end of the 20th century, it was possible to describe deindustrialization as a kind of global epidemic: worldwide manufacturing employment rose in absolute terms by 0.4 per cent per year between 1991 and 2016, but that was much slower than the overall growth of the global labour force, with the result that the manufacturing share of total employment declined by 3 percentage points over the same period.⁴⁶ China is a key exception, but only a partial one (Figure 5, overleaf). In the mid 1990s, Chinese state-owned enterprises shed large numbers of workers, sending manufacturing-employment shares on

FIGURE 4: *Global Waves of Deindustrialization, 1950–2010*

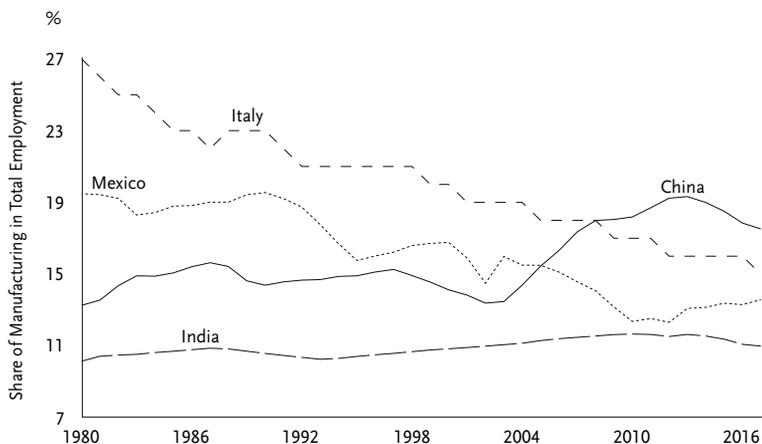


Source: Groningen Growth and Development Centre, 10-Sector Database, January 2015 edition.

⁴⁵ Fiona Tregenna describes this process as ‘pre-industrialization deindustrialization’ in ‘Deindustrialization, Structural Change and Sustainable Economic Growth’, UNIDO/UNU-MERIT background paper 32, 2015.

⁴⁶ UNIDO, *Industrial Development Report 2018*, Vienna 2017, p. 166. UNIDO suggests that the global manufacturing share fell from 14.4 per cent to 11.1 per cent in the 25 years from 1991 to 2016. However, other sources put the current share closer to 17 per cent. The UNIDO numbers appear to be lower than other sources because of the stricter way they count employment in China’s manufacturing sector.

FIGURE 5: *Deindustrialization in China, India and Mexico, 1980–2017*



Source: Conference Board, *International Comparisons of Productivity and Unit Labour Costs*, July 2018 edition.

a steady downward trajectory.⁴⁷ China re-industrialized, starting in the early 2000s, but then began to deindustrialize once again in the mid 2010s: its manufacturing-employment share has since dropped from 19.3 per cent in 2013 to 17.5 per cent in 2017, with further falls likely. If deindustrialization cannot be explained by either automation or the internal evolution of advanced economies, what could be its source?

3. BLIGHT OF MANUFACTURING OVERCAPACITY

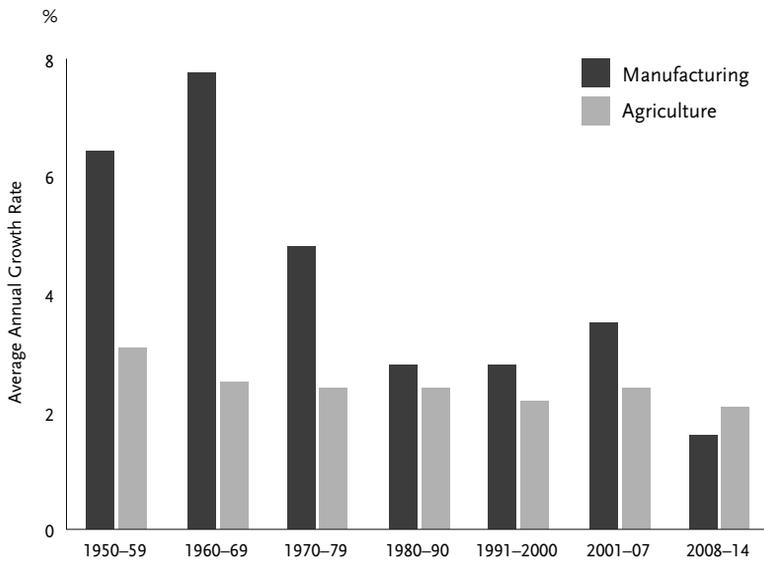
What the economists' accounts fail to register in explaining deindustrialization is also what is missing from the automation theorists' accounts. The truth is that rates of output growth in manufacturing have tended to decline, not only in this or that country, but *worldwide* (Figure 6).⁴⁸ In the 1950s and 60s, global manufacturing production expanded at an average annual rate of 7.1 per cent per year, in real terms. That rate fell progressively to 4.8 per cent in the 1970s, and to 3.0 per cent between 1980 and 2007. Since the 2008 crisis and up to 2014, manufacturing

⁴⁷ Between 1993 and 2004, employment in state-owned enterprises declined by 40 per cent, due to economic restructuring. See Barry Naughton, *The Chinese Economy: Transitions and Growth*, Cambridge MA 2007, p. 105.

⁴⁸ WTO, *International Trade Statistics* 2015.

output expanded at just 1.6 per cent per year, on a world scale—that is, at less than a quarter of the pace achieved during the so-called post-war Golden Age.⁴⁹ It is worth noting that these figures include the dramatic expansion of manufacturing productive capacity in China. Again, it is the incredible degree of slowdown or even stagnation in manufacturing-output growth, visible on the world scale, that explains why manufacturing-productivity growth appears to be advancing at a rapid clip, even though it is actually much slower than before. More and more is produced with fewer workers, as the automation theorists claim, but not because technological change is giving rise to high rates of productivity growth. On the contrary, productivity growth in manufacturing appears rapid today only because the yardstick of output growth, against which it is measured, is shrinking.

FIGURE 6: *World Manufacturing and Agricultural Production, 1950–2014*



Source: World Trade Organization, *International Trade Statistics 2015*, Table A1a, World Merchandise Exports, Production and GDP, 1950–2014.

⁴⁹ The World Bank has noted that, since the global financial crisis, ‘trade has been growing more slowly not only because economic growth has become less trade-intensive, but also because global growth is slower.’ See Mary Hallward-Driemeier and Gaurav Nayyar, *Trouble in the Making? The Future of Manufacturing-Led Development*, Washington DC 2018, p. 81.

Seen from this perspective, the global wave of deindustrialization can be said to find its origins not in runaway technical change but rather in worsening overcapacity in world markets for manufactured goods. The rise in overcapacity developed stepwise after World War Two. In the immediate postwar period, the US hosted the most dynamic economy in the world, with the most advanced technologies.⁵⁰ Under the threat of communist expansion within Europe, as well as in East and Southeast Asia, the US proved willing to share its technological largesse with its former imperial competitors Germany and Japan, as well as other 'frontline' countries, in order to bring them all under the US security umbrella.⁵¹ In the first few decades of the post-WWII era, these technology transfers were a major boost to economic growth in Europe and Japan, opening up opportunities for export-led expansion. This strategy was also supported by the devaluation of European and Japanese currencies against the dollar.⁵² However, as Robert Brenner has argued, rising manufacturing capacity across the globe quickly generated overcapacity, issuing in a 'long downturn' in manufacturing output growth rates.⁵³

What mattered here was not only the later building out of manufacturing capacity in the global South, but the earlier creation of such capacity in countries like Germany, Italy and Japan, which hosted the first low-cost producers in the postwar era who succeeded in taking shares in

⁵⁰ In 1950, output per hour worked in the overall US economy was, on average, 127 per cent higher than output per hour in European countries. See Barry Eichengreen, *The European Economy Since 1945*, Oxford 2007, p. 18.

⁵¹ On US reorientation in the context of the Cold War, see Robert Brenner, *Economics of Global Turbulence*, London and New York 2006, pp. 47–50; Eichengreen, *The European Economy*, pp. 54–8; Yutaka Kosai, *The Era of High-Speed Growth*, Tokyo 1986, pp. 53–68, Herbert Giersch et al, *The Fading Miracle: Four Decades of Market Economy in Germany*, Cambridge 1992, pp. 17–26.

⁵² See Brenner, *Economics of Global Turbulence*, pp. 67–93. Eichengreen also describes 'Europe after World War II' as a 'classic example of export-led growth'. See *The European Economy*, p. 38; and on the role of technology transfers in particular, see pp. 24–6. On the role of the 1949 devaluations, see pp. 77–9, and Kosai, *The Era of High-Speed Growth*, pp. 67–8.

⁵³ Robert Brenner has made this argument in *Economics of Global Turbulence*, as well as in more recent works. Here, I am extending his account in order to explain labour deindustrialization. See also the related literature on the 'fallacy of composition' in global trade, for example, Robert Blecker, 'The Diminishing Returns to Export-Led Growth', a paper from the *Project on Development, Trade and International Finance*, New York 2000.

global markets for industrial goods, and then invading the previously impenetrable US domestic market. That competition caused rates of industrial-output growth in the US to decline in the late 1960s, issuing in deindustrialization in employment terms. As the US responded to heightened import penetration in the 1970s by breaking up the Bretton Woods order and devaluing the dollar, these same problems spread from the highest wage countries in North America and northern Europe to Japan and the rest of Europe.⁵⁴ Thereafter, as more and more countries built up manufacturing capacity, adopted export-led growth strategies and entered global markets for manufactured goods, falling rates of manufacturing-output growth and consequent labour deindustrialization also spread to Latin America, the Middle East, Asia and Africa, as well as to the global economy taken as a whole.⁵⁵

Deindustrialization is not only a matter of technological advance, but also of a global redundancy of technological capacities, creating more crowded markets in which rapid rates of industrial-output expansion become more difficult to achieve.⁵⁶ The mechanism transmitting this problem across the globe was severely depressed prices in global markets for manufactured goods.⁵⁷ That led to falling income-per-unit capital ratios, then to falling rates of profit, then to lower rates of investment,

⁵⁴ See Brenner, *Economics of Global Turbulence*, pp. 50–1, 122–42.

⁵⁵ Deindustrialization spread to the global South in the aftermath of the 1982 Third World debt crisis, amid the imposition of IMF-led structural adjustment programmes. As trade liberalization opened the borders of poorer countries to imports, while financial liberalization brought hot money flowing into ‘emerging markets’—causing their currencies to revalue—manufacturing competitiveness declined precipitously. See UNCTAD, *Trade and Development Report 2006*, Geneva 2006, pp. 42–50; Kiminori Matsuyama, ‘Structural Change in an Interdependent World: A Global View of Manufacturing Decline’, *Journal of the European Economic Association*, vol. 7, no. 2–3, 2009, pp. 478–86.

⁵⁶ For a helpful summary of this argument, see Robert Brenner interviewed by Jeong Seong-jin, ‘Overproduction Not Financial Collapse is the Heart of the Crisis: The US, East Asia and the World’, *Asia-Pacific Journal*, vol. 7, issue 6, no. 5, 2009.

⁵⁷ See Brenner, *Economics of Global Turbulence*, pp. 108–14. For a graphical representation, see UNIDO, *Industrial Development Report 2018*, p. 172. Rodrik also notes that ‘developing countries “imported” deindustrialization from the advanced countries’ insofar as they ‘became exposed to the relative price trends originating from advanced economies’. See Rodrik, ‘Premature Deindustrialization’, p. 4. It is important to note that differences between manufacturing and non-manufacturing price trends can also be explained to some extent by Baumol’s cost disease.

and hence lower rates of output growth.⁵⁸ In this environment, firms have faced heightened competition for market share: as overall growth rates slow, the only way to grow quickly is to steal market shares from other firms. Each firm has to do everything it can to keep up with its competitors.⁵⁹ Overcapacity explains why, since the early 1970s, productivity-growth rates have fallen less severely than output-growth rates: firms have continued to raise their productivity levels as best they can despite falling rates of output growth (or else have gone under, disappearing from statistical averages). As manufacturing-output growth rates slipped below productivity-growth rates in one country after another, deindustrialization spread worldwide.

Driving globalization

Explaining global waves of deindustrialization in terms of global overcapacity rather than industrial automation allows us to understand a number of features of this phenomenon that otherwise appear paradoxical. For example, rising overcapacity explains why deindustrialization has been accompanied not only by ongoing efforts to develop new labour-saving technologies, but also by the building out of gigantic, labour-using supply chains—usually with a more damaging environmental impact.⁶⁰ A key turning point in that story came in the 1960s, when low-cost Japanese and German products invaded the US domestic market, sending the US industrial-import penetration ratio soaring from less than 7 per cent in the mid-60s to 16 per cent in the early 1970s.⁶¹ From that point forward, it became clear that high levels of labour productivity would no longer serve as a shield against competition from lower-wage

⁵⁸ See Brenner, *Economics of Global Turbulence*, pp. 37–40. The decline in the demand for investment goods in turn depressed overall demand. The result was that what looked like worsening overproduction from one perspective appeared as worsening underinvestment and hence under-demand from another perspective, resulting in slower rates of market growth and fiercer competition.

⁵⁹ All firms, regardless of whether they use advanced technologies, must consistently upgrade their capacities. See Sanjaya Lall, 'The Technological Structure and Performance of Developing Country Manufactured Exports, 1985–98', *Oxford Development Studies*, vol. 28, no. 3, 2000, pp. 337–69.

⁶⁰ See Gary Gereffi, 'The Organization of Buyer-Driven Global Commodity Chains: How US Retailers Shape Overseas Production Networks', in Gary Gereffi and Miguel Korzeniewics, eds, *Commodity Chains and Global Capitalism*, London 1994. For a more recent account, see William Milberg and Deborah Winkler, *Outsourcing Economics: Global Value Chains in Capitalist Development*, London 2013.

⁶¹ Brenner, *Economics of Global Turbulence*, p. 113.

countries. The US firms that did best in this context were the ones that responded by globalizing production. Facing competition on prices, US multinational firms built international supply chains, shifting the more labour-intensive components of their production processes abroad and playing suppliers off against one another to achieve the best prices.⁶² In the mid-60s the first export-processing zones opened in Taiwan and South Korea. Even Silicon Valley, which formerly produced its computer chips locally in the San Jose area, shifted its production to low-wage areas, using lower grades of technology (and also benefitting from laxer laws around pollution and workers' safety).⁶³ MNCs in Germany and Japan adopted similar strategies, which were everywhere supported by new infrastructures of transportation and communication technologies.

The globalization of production allowed the world's wealthiest economies to retain manufacturing capacity, but it did not reverse the overall trend towards labour deindustrialization. As supply chains were built out across the world, firms in more and more countries were pulled into the swirl of world-market competition. In some countries, this move was accompanied by shifts in the location of new plants: rustbelts oriented towards production for domestic markets went into decline, while sunbelts integrated into global supply networks expanded dramatically. Chattanooga grew at the expense of Detroit, Ciudad Juárez at the expense of Mexico City, Guangdong at the expense of Dongbei.⁶⁴ Yet given the overall slowdown in rates of world manufacturing-market expansion, this re-orientation towards the world market could only result in lacklustre outcomes: the rise of sunbelts failed to balance out the decline of rustbelts, resulting in global deindustrialization.

At the same time, global manufacturing overcapacity explains why the countries that have succeeded in attaining a high degree of robotization

⁶² For an early account of this process, see G. K. Helleiner, 'Manufacturing Exports From Less-Developed Countries and Multinational Firms', *Economic Journal*, vol. 83, no. 329, 1973, p. 28 ff. Between 1966 and 1980, US imports of goods produced in that country but then assembled abroad rose in value from \$953 million to almost \$14 billion, an increase of more than 1,300 per cent in 15 years. See *Imports Under Items 806.30 and 807.00 of the Tariff Schedules of the United States, 1984-87*, Washington, DC 1988.

⁶³ Dyer-Witheford, *Cyber-Proletariat*, p. 71.

⁶⁴ For an account of China's rustbelt in a global comparative context, see Ching Kwan Lee, *Against the Law: Labour Struggles in China's Rustbelt and Sunbelt*, Berkeley 2007, especially pp. 242-58.

are not those that have seen the worst degree of deindustrialization. In the context of intense global competition, high degrees of robotization have given firms competitive advantages, allowing them to take market share from firms in other countries. Thus Germany, Japan and South Korea have some of the highest levels of robotization; they also have the largest trade surpluses in the world. Workers in European and East Asian firms know that automation helps preserve their jobs.⁶⁵ China is also a top-four country in terms of trade surpluses, providing its manufacturing sector with a gigantic boost in terms of both output and employment growth. China has advanced on this front not due to high levels of robotization, but rather due to a mix of low wages, moderate to advanced technologies, and strong infrastructural capacities. Yet the result was the same: in spite of system-wide overcapacity and slow growth rates, the PRC has industrialized rapidly because Chinese firms have been able to take market share away from other firms—not only in the US, but also in countries like Mexico and Brazil—which lost market share as Chinese firms expanded. It could not have been otherwise, since in an environment where average growth rates are low, firms can only achieve high rates of growth by taking market share from their competitors. Whether China will be able to retain its competitive position as its wage levels rise remains an open question; Chinese firms are now racing to robotize in order to head off this possibility.

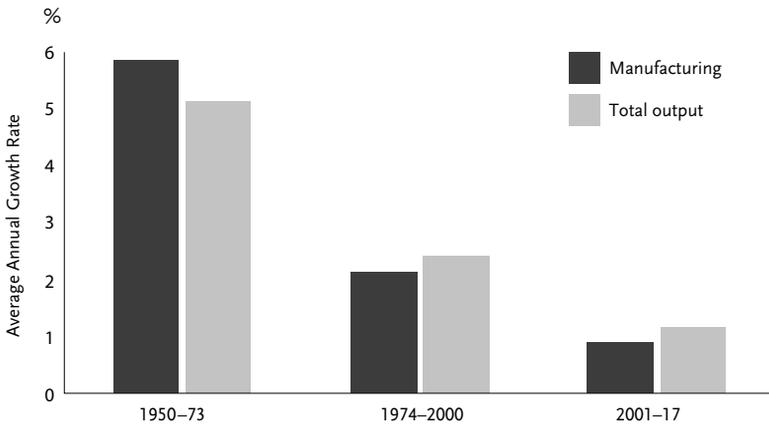
4. BEYOND MANUFACTURING

The evidence I have cited so far to explain job loss in the manufacturing sector through worsening overcapacity may appear to have little purchase on the larger, economy-wide patterns—of stagnant wages, falling labour shares of income, declining labour-force participation rates and jobless recoveries after recessions—that the automation theorists have sought to explain by growing technological dynamism. Automation may therefore still seem a good explanation for the decline in demand for labour across the service sectors of each country's economy, and so across the world economy as a whole. Yet this broader problem of declining labour demand also turns out to be better explained by the worsening industrial stagnation I have described than by widespread technological dynamism.

⁶⁵ Peter Goodman, 'The Robots Are Coming and Sweden Is Fine', *NYT*, 27 December 2017; Yuri Kageyama, 'Reverence for Robots: Japanese Workers Treasure Automation', *Associated Press News*, 16 August 2017.

This is because, as rates of manufacturing-output growth stagnated in one country after another from the 1970s onward, no other sector appeared on the scene to replace industry as a major economic-growth engine. Instead, the slowdown in manufacturing-output growth rates was accompanied by a slowdown in overall growth rates. This trend is visible in the economic statistics of high-income countries. France is again a striking example (Figure 7). In France, real manufacturing value added (MVA) rose at 5.9 per cent per year between 1950 and 1973, while real value added in the total economy (GDP) rose at 5.1 per cent per year.⁶⁶ Since 1973, both growth measures have declined significantly: by the 2001–17 period, MVA was rising at only 0.9 per cent per year, while GDP was rising at a faster but still sluggish pace of 1.2 per cent per year. Note that during the 1950s and 60s, MVA growth generally led the overall economy: manufacturing served as the major engine of overall growth. Since 1973, MVA growth rates have trailed overall economic growth. Similar patterns can be seen in other high-income countries (Table 2, overleaf). Their export-led growth engines sputtered and slowed to a crawl; and as they did so, overall rates of economic growth slowed considerably.⁶⁷

FIGURE 7: *French Manufacturing and Total Output Growth, 1950–2017*



Source: Conference Board, *International Comparisons of Productivity and Unit Labour Costs*, July 2018 edition.

⁶⁶ Unless otherwise noted, MVA and GDP growth rates will be cited in real, inflation adjusted terms, rather than in nominal terms. Measures of GDP growth come from the Conference Board, ‘Total Economy Database’.

⁶⁷ In Germany, MVA and GDP growth rates have fallen since 1973, but MVA is still growing at a faster pace than GDP. Meanwhile, in Italy, the economy has completely stagnated.

TABLE 2: *Manufacturing and GDP Growth Rates, 1950–2017*

		MVA	GDP
USA	1950–73	4.4%	4.0%
	1974–00	3.1%	3.2%
	2001–17	1.2%	1.9%
Germany	1950–73	7.6%	5.7%
	1974–00	1.3%	1.9%
	2001–17	2.0%	1.4%
Japan	1950–73	14.9%	9.3%
	1974–00	2.8%	3.2%
	2001–17	1.7%	1.9%

Source: Conference Board, *International Comparisons of Productivity and Unit Labour Costs*, July 2018 edition.

Economists studying deindustrialization often point out that while manufacturing has declined as a share of nominal GDP, it has maintained, until recently, a more or less steady share of real GDP, which is to say that, between 1973 and 2000, real MVA grew at approximately the same pace as real GDP.⁶⁸ What that has meant in practice is that, as manufacturing has become less dynamic, so has the overall economy. There was no significant shift in demand from industry to services. Instead, as capital accumulation slowed down in manufacturing, the expansion of aggregate output also slowed significantly across the economy as a whole.

This tendency to economy-wide stagnation, associated with the decline in manufacturing dynamism, then explains the system-wide decline in the demand for labour, and so also the problems that the automation theorists cite: stagnant real wages, falling labour shares of income and

⁶⁸ See William Baumol, ‘Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis’, in *American Economic Review*, vol. 57, no. 3, June 1967, pp. 415–26; Rowthorn and Ramaswamy, ‘Deindustrialization: Causes and Implications’, pp. 9–11; Rodrik, ‘Premature Deindustrialization’, p. 16.

so on.⁶⁹ This economy-wide pattern of declining labour demand is not the result of rising productivity-growth rates, associated with automation in the service sector. On the contrary, productivity is growing even more slowly outside of the manufacturing sector than inside of it: in France, for example, while productivity in the manufacturing sector was rising at an average annual rate of 2.7 per cent per year between 2001–17, productivity in the service sector was rising at just 0.6 per cent per year.⁷⁰ Similar gaps exist in other countries. Once again, the mistake of the automation theorists is to focus on rising productivity growth rather than falling output growth. The environment of slower economic growth explains the low demand for labour all by itself. Workers, and especially workers who are not protected by powerful unions or labour laws, find it difficult to pressure employers to raise their wages when there is so much slack in the labour market.

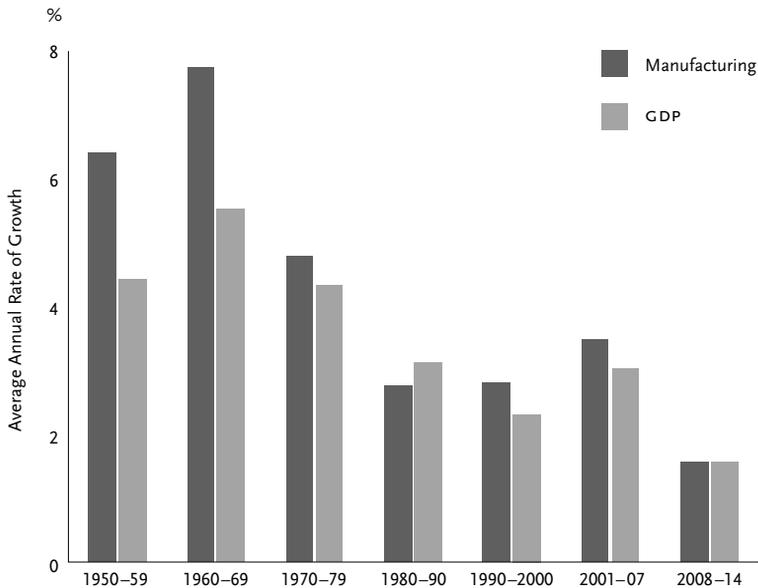
These trends are as visible in the world economy—including China—as they are in the high-income countries (Figure 8, overleaf). In the 1950s and 60s, global MVA growth and GDP growth were expanding at rapid clips of 7.1 per cent and 5.0 per cent respectively, with MVA growth leading GDP growth by a significant margin. From the 1970s onward, as global MVA growth slowed, so did global GDP growth. In most of the decades that followed, global MVA growth continued to lead GDP growth but by a much smaller margin. Since 2008, both rates have been growing at the exceptionally slow pace of 1.6 per cent per year. Again, the implication is that, as manufacturing growth rates declined, nothing emerged to replace industry as a growth engine. Not all regions of the world economy are experiencing this slowdown in the same way or to the same extent, but even countries like China that have grown quickly have to contend with this global slowdown and its consequences. Since the 2008 crisis, China's economic growth rate has slowed considerably; its economy is deindustrializing.

⁶⁹ Some economists have attempted to theorize tendential economic stagnation and its relationship to rising inequality. See, for example, Thomas Piketty, *Capital in the Twenty-First Century*, Cambridge, MA 2014; Gordon, *Rise and Fall of American Growth*; and the essays collected around Lawrence Summers's hypothesis in Coen Teulings and Richard Baldwin, eds, *Secular Stagnation: Facts, Causes and Cures*, London 2014.

⁷⁰ Statistics taken from the OECD main indicators database, 2018 edition. Note that productivity is measured here in terms of output per person employed, rather than output per hour, for the sake of consistency.

The clear conclusion is that manufacturing turned out to be a unique engine of overall economic growth.⁷¹ Industrial production tends to be amenable to incremental increases in productivity, achieved via technologies that can be repurposed across numerous lines. Industry also benefits from static and dynamic economies of scale. Meanwhile, there is no necessary boundary to industrial expansion: industry consists of all economic activities that are capable of being rendered via an industrial process. The reallocation of workers from low-productivity jobs in agriculture, domestic industry and domestic services to high-productivity jobs in factories raises levels of income per worker and hence overall economic growth rates. The countries that have caught up with the West

FIGURE 8: *World Manufacturing and Total Production, 1950–2014*



Source: Conference Board, *International Comparisons of Productivity and Unit Labour Costs*, July 2018 edition.

⁷¹ For the original account of this phenomenon, see Nicholas Kaldor, *Causes of the Slow Rate of Economic Growth in the United Kingdom*, Cambridge 1966. For an extended discussion, see also Hallward-Driemeier and Nayyar, *Trouble in the Making?*, pp. 9–37.

in terms of income—such as Japan, South Korea and Taiwan—mostly did so by industrializing: they exploited opportunities to produce for the world market, at increasing scale and using advanced technologies, allowing them to grow at speeds that would have been unachievable had they depended on domestic-market demand alone.⁷²

When the growth engine of industrialization sputters—due to the replication of technical capacities, international redundancy and fierce competition for markets—there has been no replacement for it as a source of rapid growth. Instead of workers reallocating from low-productivity jobs to high-productivity ones, the reverse of this process takes place, as workers pool increasingly in low-productivity jobs in the service sector. As countries have deindustrialized, they have also seen a massive build-up of financialized capital, chasing returns to the ownership of relatively liquid assets, rather than investment in new fixed capital.⁷³ In spite of the high degree of overcapacity in industry, there is nowhere more profitable in the real economy for capital to invest itself. Indeed, if there had been, we would have evidence of it in higher rates of investment and hence higher GDP growth rates. This helps explain why firms have reacted to over-accumulation by trying to make their existing manufacturing capacity more flexible and efficient, rather than ceding territory to lower-cost, higher-productivity firms from other countries.⁷⁴

The lack of an alternative growth engine also explains why governments in poorer countries have encouraged domestic producers to try to break into already oversupplied international markets for manufactures.⁷⁵ Nothing has replaced those markets as a major source of globally accessible demand. Overcapacity exists in agriculture, too, and is even worse there than in industry; meanwhile services, which are mostly

⁷² See Adam Szirmai, 'Industrialization as an Engine of Growth in Developing Countries, 1950–2005', in *Structural Change and Economic Dynamics*, vol. 23, issue 4, 2012, pp. 406–20. See also Adam Szirmai and Bart Verspagen, 'Manufacturing and Economic Growth in Developing Countries, 1950–2005', *Structural Change and Economic Dynamics*, vol. 34, September 2015, pp. 46–59.

⁷³ See Robert Brenner, 'What's Good for Goldman Sachs Is Good for America', prologue to the Spanish translation of *Economics of Global Turbulence*, published by Akal in 2009. For an alternative account, see Robert Skidelsky, *Keynes: The Return of the Master*, London 2010.

⁷⁴ Brenner, *Economics of Global Turbulence*, pp. 153–7.

⁷⁵ Brenner, *Economics of Global Turbulence*, pp. 153–7.

non-tradable, make up only a tiny share of global exports.⁷⁶ If countries are to retain any dependable link to the international market under these conditions, they must find some way to insert themselves into industrial lines, however oversupplied. System-wide overcapacity and the generalized slowdown in economic growth have therefore been devastating for most poorer countries: the amount of foreign exchange they have captured through liberalization has been pitiful; so, too, has been the number of jobs created.⁷⁷

Indeed, global economic downshifts have been particularly devastating for low- and middle-income countries, not only because they are poorer, but also because those downshifts have taken place in an era of rapid labour-force expansion: between 1980 and the present, the world's waged workforce grew by about 75 per cent, adding more than 1.5 billion people to the world's labour markets.⁷⁸ These labour market entrants, living mostly in poorer countries, had the misfortune of growing up and looking for work at a time when global industrial overcapacity began to shape patterns of economic growth in post-colonial countries: declining rates of manufactured export growth into the US and Europe in the late 1970s and early 1980s ignited the 1982 debt crisis, followed by IMF-led structural adjustment, which pushed countries to deepen their imbrications in global markets at a time of ever slower global growth and rising competition from China. In spite of shocks to the demand for labour generated by slowing global growth rates and rising economic turmoil, huge numbers of workers were still forced to seek employment in order to live.⁷⁹

⁷⁶ Manufactures account for 70 per cent of global trade; primary commodities, including agricultural goods, fuel and minerals, account for 25 per cent; services account for just 5 per cent. WTO, *World Trade Statistical Review 2018*, Geneva 2018, p. 11. On overproduction in agriculture, see UN Food and Agriculture, *State of Food and Agriculture 2000*, Rome 2000.

⁷⁷ Raphael Kaplinsky, 'Export Processing Zones in the Dominican Republic: Transforming Manufactures into Commodities', *World Development*, vol. 21, no. 11, 1993, pp. 1851–65. See also William Milberg and Matthew Amengual, 'Economic Development and Working Conditions in Export Processing Zones: A Survey of Trends', ILO Working Paper, Geneva 2008; Milberg and Winkler, *Outsourcing Economics*.

⁷⁸ Conference Board, 'Total Economy Database'. See also Richard Freeman, 'The Great Doubling: The Challenge of the New Global Labour Market', in J. Edwards, et al, eds, *Ending Poverty in America: How to Restore the American Dream*, New York 2007.

⁷⁹ See Mike Davis, *Planet of Slums*, London and New York 2006. See also Aaron Benanav, 'Demography and Dispossession: Explaining the Growth of the Global Informal Workforce, 1950–2000', *Social Science History*, vol. 43, no. 4, 2019.

Some may respond that the present low rates of global growth are in fact nothing out of the ordinary, if only we shift our baseline from the exceptional postwar ‘Golden Age’ to previous periods, such as the pre-wwi era. But a global perspective on the decline in the demand for labour provides the answer to this objection. It is true that, during the Belle Epoque, average rates of economic growth were more comparable to growth rates today.⁸⁰ However, in that period, large sections of the population still lived in the countryside and produced much of what they needed to live.⁸¹ European empires still overran the globe, not only limiting the diffusion of new manufacturing technologies to a few regions, but also actively deindustrializing the rest of the world economy.⁸² Yet in spite of the much more limited sphere in which labour markets were active—and in which industrialization took place—the pre-wwi era, as also the inter-war period, was marked by a *persistently low demand for labour*, making for employment insecurity, rising inequality and tumultuous social movements aimed at transforming economic relations.⁸³ In this respect, the world of today *does* look like the world of the Belle Epoque.⁸⁴ The difference is that today, a much larger share of the world’s population depends on finding work in labour markets in order to live.

What automation theorists describe as the result of rising technological dynamism is actually the consequence of worsening economic stagnation: productivity-growth rates appear to rise when, in reality, output-growth rates are falling. This mistake is not without reason. The

⁸⁰ For example, from 1870 to 1913, GDP grew at an average annual rate of 1.9 per cent per year in the UK (as compared to 1.6 per cent per year for 2001–17), 1.6 per cent per year in France (as compared to 1.2 per cent per year), and 2.9 per cent per year in Germany (as compared to 1.4 per cent per year). See Stephen Broadberry and Kevin O’Rourke, *The Cambridge Economic History of Modern Europe, Volume 2: 1870 to the Present*, Cambridge 2010, p. 36.

⁸¹ In 1913, 47 per cent of Europe’s population was still working in agriculture. Broadberry and O’Rourke, *Cambridge Economic History*, p. 61.

⁸² See Paul Bairoch, ‘International Industrialization Levels from 1750 to 1980’, *Journal of European Economic History*, vol. 11, no. 2, Fall 1982. See also Jeffrey Williamson, *Trade and Poverty: When the Third World Fell Behind*, London 2011.

⁸³ See for example Alexander Keyssar, *Out of Work: The First Century of Unemployment in Massachusetts*, Cambridge 1986; Christian Topalov, *Naissance du chômeur, 1880–1919*, Paris 1994.

⁸⁴ Kristin Ross draws an evocative parallel between the experiences of the workers who entered Occupy Oakland on the one hand and the Paris Commune on the other in *Communal Luxury: The Political Imaginary of the Paris Commune*, London and New York 2015, p. 3.

demand for labour is determined by the gap between productivity and output growth rates. Reading the shrinking of this gap the wrong way around—that is, as due to rising productivity rather than falling output rates—is what generates the upside-down world of the automation discourse. Proponents of this discourse then search for the technological evidence that supports their view of the causes for the declining demand for labour. In making this leap, the automation theorists miss the true story of overcrowded markets and economic slowdown that actually explains the decline in labour demand.

Yet even if automation is not itself the primary cause of a low demand for labour, it is nevertheless the case that, in a slow-growing world economy, technological changes within a near-future horizon may still threaten large numbers of jobs with destruction, in a context of economic stagnation and slower rates of job creation. Technological change then acts as a secondary cause of a low labour demand, operating within the context of the first. The concluding section of this essay in NLR 120 will address these technological dynamics, as well as the socio-political problems—and opportunities—generated by a persistently low demand for labour in late-capitalist societies.

AUTOMATION AND THE FUTURE OF WORK—2

WE LIVE IN an era of dizzying technological change, with smartphones, self-driving cars and automated stock-trading desks apparently set to transform life across the globe. What will human beings do in an automated future? Will we be able to adapt our social and political institutions to realize the dream of human freedom presaged by a new age of machines? Or will it turn into a nightmare of mass joblessness? In Part One of this essay, I identified a new automation discourse, propounded by liberal, right-wing and left analysts alike.¹ These automation theorists claim that mass technological unemployment will need to be managed by the provision of universal basic income (UBI), since large sections of the population will lose access to wage labour.² I argued that the resurgence of this feverish discourse is a response to a real trend unfolding across the world: a chronic under-demand for labour. However, the explanation the automation theorists offer—runaway technological change destroying jobs—is false. The real cause of the persistently low demand for labour is the progressive slowdown of economic growth since the 1970s, as industrial overcapacity spread around the world, and no alternative growth engine materialized—a development originally analysed by Robert Brenner, and belatedly and obliquely recognized by mainstream economists under the name of ‘secular stagnation’ or ‘Japanification’.³ As economic growth decelerates, job creation slows, and it is this, not technology-induced job destruction, which is depressing the global demand for labour.

In Part Two, I demonstrate that employment outcomes have differed in important respects from the automation theorists’ predictions. I analyse the contemporary dynamics of the global labour market and consider

the solutions automation theorists have proposed, notably UBI, before going on to consider, as a thought experiment, an alternative approach to achieving a post-scarcity future. First, however, I will argue that it is crucial that we reconceive of the present situation as marked not by the imminent arrival of mass *un*employment, as automation theorists suggest, but by continuously rising *under*-employment. A survey of worldwide vistas of insecure work shows that this new reality has already been accepted by wealthy elites. Turning the tide towards a more humane future will therefore depend on masses of working people refusing to accept a persistent decline in the demand for their labour, and the rising economic inequality it entails. Struggles against these outcomes are already unfolding across the globe. If they fail, maybe the best we will get is a slightly higher social wage in the form of UBI. However, we should not be fighting for this goal, but rather to inaugurate a post-scarcity planet.

I. GLOBAL LABOUR-MARKET DYNAMICS

What lessons can be gleaned from past experiences of job losses and profit-driven technological breakthroughs? On their own, these have

¹ Aaron Benanav, 'Automation and the Future of Work-1', NLR 119, Sept–Oct 2019.

² The automation theorists under discussion include Erik Brynjolfsson and Andrew McAfee, *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies*, London 2014; Martin Ford, *Rise of the Robots: Technology and the Threat of a Jobless Future*, New York 2015; Carl Frey and Michael Osborne, 'The Future of Employment: How Susceptible Are Jobs to Computerization?', *Technological Forecasting and Social Change*, vol. 114, January 2017; Andrew Yang, *The War on Normal People: The Truth About America's Disappearing Jobs and Why Universal Basic Income Is Our Future*, New York 2018; Andy Stern, *Raising the Floor: How a Universal Basic Income Can Renew Our Economy and Rebuild the American Dream*, New York 2016; Nick Srnicek and Alex Williams, *Inventing the Future: Postcapitalism and a World Without Work*, London and New York 2015; Nick Dyer-Witford, *Cyber-Proletariat: Global Labour in the Digital Vortex*, London 2015; Peter Frase, *Four Futures: Life After Capitalism*, London and New York 2016; Manu Saadia, *Treconomics: The Economics of Star Trek*, San Francisco 2016; Aaron Bastani, *Fully Automated Luxury Communism: A Manifesto*, London and New York 2019; see also Nick Dyer-Witford et al., *Inhuman Power: Artificial Intelligence and the Future of Capitalism*, London 2019.

³ Robert Brenner, *The Economics of Global Turbulence*, London and New York 2006 [1998]. On secular stagnation, see Lawrence Summers, 'Secular Stagnation and Macroeconomic Policy', *IMF Economic Review*, vol. 66, no. 2, 2018; on 'Japanification', see John Plender, 'Why "Japanification" Looms for the Sluggish Eurozone', *Financial Times*, 19 March 2009.

never overcome human drudgery altogether. Nevertheless, they do periodically result in sweeping job destruction in certain industries, particularly when they allow firms to overcome a long-standing resistance to industrial development. Agriculture, for example, was one of the first sectors to be transformed by modern production methods: in the 15th- and 16th-century English countryside, new forms of animal husbandry on enclosed farms were combined with crop rotation to raise yields. Yet farming remained difficult to mechanize, due to the uneven terrain of fields and seasonal cycles, and for centuries it continued to be a major source of employment.⁴ In the 1940s, however, advances in synthetic fertilizers, the hybridization of crops and the mechanization of farming implements made it possible to develop industrialized forms of agricultural production, and operative logics shifted dramatically.⁵

Labour productivity took off, as farms came to resemble open-air factories. Given the limits to the growth of the demand for agricultural outputs, the sector then shed workers at an incredible pace. As late as 1950, agriculture employed 24 per cent of the workforce in West Germany, 25 per cent in France, 42 in Japan, and 47 in Italy; by 2010, all of these shares were under 5 per cent. During the 1950s and 60s Green Revolution, methods of industrialized agriculture were adapted for tropical climates, with stunning consequences for global agricultural employment: in 1983, the majority of the world's workers were still in agriculture; that figure has since fallen to 25 per cent.⁶ The major global job destroyer in the 20th century was not 'silicon capitalism' but nitrogen capitalism. No mechanism existed within the labour market to ensure that as many new jobs were created outside of agriculture as had been lost within it.

Firms are still seeking ways to overcome obstacles to industrialization, but in the present era of slowing overall growth rates and generally slack labour markets, these innovations tend to leave working people without steady jobs. For example, on a global scale, the mechanization

⁴ Strong tariff protections against imports from lower-wage countries were also key. See Niek Koning, *The Failure of Agrarian Capitalism: Agrarian Politics in the UK, Germany, the Netherlands and the USA, 1846–1919*, London 2002.

⁵ See FAO, *State of Food and Agriculture 2000*; and Marcel Mazoyer and Laurence Roudart, *A History of World Agriculture: From the Neolithic Age to the Current Crisis*, London 2006, pp. 375–440.

⁶ Statistics drawn from the Groningen Growth and Development Centre, '10-Sector Database', updated January 2015, and from FAO, *FAOSTAT* and ILO, *Key Indicators of the Labour Market*, 9th edition, 2015.

of electronics assembly and apparel and footwear industries would be devastating: these sectors employ large numbers of people worldwide and generate foreign exchange for otherwise cash-strapped economies. Sewing in particular has long been resistant to technological modernization: it involves detailed work with fabrics, which machines have trouble manipulating; the last major innovation in the field was the Singer sewing machine in the 1850s. Electronics assembly work, although of more recent vintage, has proven similarly resistant to labour-saving innovation, since it too requires the delicate manipulation of tiny parts. As technological laggards within larger, highly mechanized production processes, these jobs were some of the first to globalize in the 1960s. Retail, apparel and electronics firms contracted suppliers in low-wage countries to meet a growing demand.⁷ These industries remain significant as the first links of industrial supply chains, where they are subject to fierce competition among suppliers.

Much of this kind of work has relocated to China since the 1990s. However, even as Chinese wages rise and other countries become more competitive, advances in robotics may finally be overcoming long-standing resistance to further mechanization within these fields. Foxconn is deploying ‘foxbots’ to stave off competition from electronics assemblers in lower-wage countries. In China and Bangladesh, apparel companies are using ‘sewbots’ and new knitting technologies, which may also be extended to the manufacture of footwear. These innovations are unlikely to lead to full automation in these sectors, but they could eliminate lots of jobs very quickly, and block access to the global economy for further low-wage countries, in Africa for example.⁸ It is unclear whether these technological developments are ten or twenty years away, and they may not occur on any scale at all. Yet even without major advances in

⁷ See Ellen Israel Rosen, *Making Sweatshops: The Globalization of the US Apparel Industry*, London 2002; and Jefferson Cowie, *Capital Moves: RCA’s Seventy-Year Quest for Cheap Labour*, New York 1999.

⁸ Phil Neel, ‘Swoosh’, *Ultra*, 8 November 2015; Anna Nicolaou and Kiran Stacey, ‘Stitched Up By Robots’, *FT*, 19 July 2017; Jennifer Bissell-Linsk, ‘Robotics in the Running’, *FT*, 23 October 2017; Jon Emont, ‘The Robots Are Coming for Garment Workers. That’s Good for the US, Bad for Poor Countries’, *WSJ*, 16 February 2018; Kevin Sneader and Jonathan Woetzel, ‘China’s Impending Robot Revolution’, *WSJ*, 3 August 2016; Saheli Roy Choudhury, ‘China Wants to Build Robots to Overtake Its Rivals—But It’s Not There Yet’, *CNBC*, 16 August 2018; Brahim Coulibaly, ‘Africa’s Race Against the Machines’, *Project Syndicate*, 16 June 2017; AFP, ‘Tech to Cost Southeast Asia Millions of Jobs, Doom “Factory Model”, Warns WEF’, *AFP International Text Wire*, 12 September 2018.

automation, ‘Industry 4.0’ and ‘smart-factory’ technologies will increase the advantages of industrial clustering in the vicinity of related services, with the result that manufacturing jobs are more likely to be globally concentrated than dispersed.⁹

By overcoming impediments to mechanization in sectors that have hitherto acted as major labour-absorbers, new technologies may serve as a secondary cause of the under-demand for labour. However, the key to explaining this phenomenon is not the rapid pace of job destruction in specific branches, if it occurs, but the absence of a corresponding pace of job creation in the wider economy. As I argued in NLR 119, the main explanation for that is not rising productivity-growth rates, as the automation theorists claim, but inadequate output demand, due to the proliferation of industrial capacities across the world, an associated over-accumulation of capital, and a consequent downshift in rates of manufacturing expansion and economic growth overall. These remain the primary economic and social causes of the slack in the labour market that is wracking workers across the world.

Mass under-employment

At the core of contemporary automation discourse is the concept of what the Harvard economist Wassily Leontief called ‘long-run technological unemployment’. Extrapolating from particular instances of automation and job loss, this is portrayed as an economy-wide phenomenon. Like ‘whale oil’ and ‘horse labour’, Erik Brynjolfsson and Andrew McAfee explain in *The Second Machine Age*, human exertion may soon find itself ‘no longer needed in today’s economy even at zero price’.¹⁰ Were full

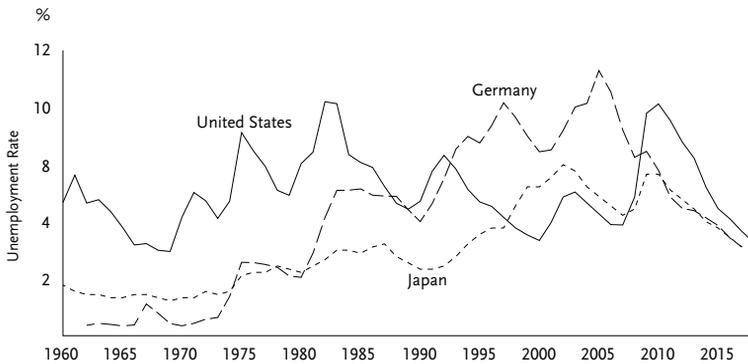
⁹ Mary Hallward-Driemeier and Gaurav Nayyar, *Trouble in the Making? The Future of Manufacturing-Led Development*, Washington DC 2018, pp. 93–6. Global employment in the IT and call-centre sectors also seems set to decline as cloud-based computing obviates the need for firms to develop and monitor their own websites and online databases; large Indian IT firms are already shedding jobs. See Simon Mundy, ‘India’s Tech Workers Scramble for Jobs as Industry Automates’, FT, 27 May 2017.

¹⁰ Wassily Leontief, ‘Technological Advance, Economic Growth and the Distribution of Income’, *Population and Development Review*, vol. 9, no. 3, 1983, p. 409; Brynjolfsson and McAfee, *Second Machine Age*, p. 179. Dyer-Witheford speaks of a ‘deepening pool of unemployed populations, no longer required by digital capital’: *Cyber-Proletariat*, p. 3, while Yang refers to a ‘growing mass of the permanently displaced’: *War on Normal People*, p. xli.

automation ever achieved, the resulting jobs apocalypse would quickly demonstrate that social life had to be reorganized so that waged work was no longer at its centre.¹¹ But has the decline in the demand for labour actually been accompanied by rising unemployment rates, as the automation discourse suggests it should have?

In the advanced capitalist countries, average unemployment rates rose in the 80s and 90s, and the 2008 crisis sent them back up. But over the past decade, they have generally dropped again, although at a slower pace than after past recessions (Figure 1). These data are sometimes taken as evidence that the demand for labour has not secularly declined. The point is rather that the forms in which that decline expresses itself have shifted from *unemployment* to various kinds of *under-employment*, which are more difficult to measure.¹² As many commentators have

FIGURE 1: *Unemployment Rates in the US, Germany and Japan, 1960–2017*



Source: OECD Main Economic Indicators, Unemployment Rate, Ages 15 and over.

¹¹ According to science-fiction writer Arthur C. Clarke, 'the goal of the future is full unemployment, so we can play': 'Free Press Interview: A. C. Clarke', *Los Angeles Free Press*, 25 April 1969. See also Brynjolfsson and McAfee, *Second Machine Age*, pp. 180–1; and Ford, *Rise of the Robots*, pp. 194–6.

¹² On the theory and history of jobless recoveries in the US, see Nir Jaimovich and Henry E. Siu, 'Job Polarization and Jobless Recoveries', NBER Working Paper no. 18334, August 2012, revised November 2018. On the limits of unemployment as a measure of labour-market health, see David Blanchflower, *Not Working: Where Have All the Good Jobs Gone?*, Princeton 2019. On the genesis of unemployment as an economic category, see Michael Piore, 'Historical Perspectives and the Interpretation of Unemployment', *Journal of Economic Literature*, vol. 25, no. 4, 1987.

recognized, we are heading towards a ‘good job-less future’ rather than a ‘jobless’ one: ‘workers have to keep working in order to feed themselves, so they take any jobs in sight’, even those offering poor pay, limited hours or terrible working conditions.¹³ Automation theorists interpret this as a consequence of growing technological unemployment, occurring somewhere offstage. In reality, rapid automation of production is hardly taking place at all—offstage or anywhere else.

In the decades since the early 1970s, as unemployment rates first rose and then stubbornly refused to fall, governments pushed for the weakening of labour-market protections and scaled back unemployment benefits.¹⁴ ‘Workfare’ policies, forcing the unemployed back to work, replaced passive income-support systems as the main institutional response to job loss. In countries such as the US, UK and Germany, few workers remain visibly and countably unemployed for long. Instead, they are typically obliged to join new labour-market entrants in jobs that are part-time, temporary or otherwise precarious, in economies that can no longer offer them anything better. The degree to which precarity then spreads across the aggregate workforce varies by country. Such shifts are easiest to document in the US, where non-unionized workers lack basic employment protections and, except in cases of outright discrimination, can be hired and fired at will. Here the unemployed were reabsorbed but at the cost of wage stagnation and worsening conditions.¹⁵

By contrast, in parts of Europe and wealthy East Asia, where employment protections are stronger, important sections of the labour force are insulated from the market pressures associated with periods of joblessness. Government strategy here has been to allow disadvantaged classes of workers to emerge. These ‘non-standard’ workers have no access to employment protections and are obliged to moderate their wage demands

¹³ Yang, *War on Normal People*, p. 80. Laura Tyson, ‘Labour Markets in the Age of Automation’, *Project Syndicate*, 7 June 2017.

¹⁴ For an account of how different welfare-state regimes adapted to the return of high unemployment, see Gøsta Esping-Andersen, *Social Foundations of Postindustrial Economies*, Oxford 1999; and Kathleen Thelen, *Varieties of Liberalization and the New Politics of Social Solidarity*, Cambridge 2014. For a critical response to Thelen, see Lucio Baccaro and Chris Howell, *Trajectories of Neoliberal Transformation: European Industrial Relations since the 1970s*, Cambridge 2017.

¹⁵ For the classic account, see Barry Bluestone and Bennett Harrison, ‘The Great American Jobs Machine: The Proliferation of Low Wage Employment in the US Economy’, Study for the Joint Economic Committee, Washington DC 1986.

to meet labour-market realities.¹⁶ Between 1985 and 2013, the share of ‘non-standard employment’ in total employment rose: from 21 per cent to 34 per cent in France; from 25 to 39 per cent in Germany; and from 29 to 40 per cent in Italy. In Japan, the share of ‘non-regular employment’ rose from 17 per cent in 1986 to 34 per cent in 2008, with similar trends unfolding in South Korea. These changes in the composition of employment are even more dramatic in new job offerings: 60 per cent of jobs created in OECD countries in the 1990s and 2000s were non-standard.¹⁷ Labour markets in these countries are becoming bifurcated between workers still in ‘standard’ employment, with relative job security, and a growing mass of typically younger outsiders who lack these benefits.¹⁸

In low- and middle-income countries, where the majority of the world’s workers live, ‘non-standard’ work has always been the norm; the ILO estimates that barely a fifth of unemployed workers receive benefits worldwide.¹⁹ The unemployed are therefore forced to find a source of income as quickly as possible, with the result that the measured unemployment rate is just 5.3 per cent in these regions, despite the dearth of job opportunities. Workers who lose their jobs mostly join young labour-market entrants in working informally—often in unincorporated micro-enterprises of five or fewer workers. Almost 70 per cent of employment in low- and middle-income regions was classed as informal in 2016.²⁰

Post-industrial doldrums

Instead of rapidly rising unemployment associated with a breakthrough to an automated future we are seeing rampant under-employment due

¹⁶ See Patrick Emmenegger et al., eds, *The Age of Dualization: The Changing Face of Inequality in Deindustrializing Societies*, Oxford 2012, on the evolution of insider/outsider distinctions within European welfare states. For an overview, see ILO, *Non-Standard Employment Around the World*, Geneva 2016.

¹⁷ OECD, *In It Together: Why Less Inequality Benefits All*, 2015, p. 144. See also Shihō Futagami, ‘Non-Standard Employment in Japan: Gender Dimensions’, International Institute for Labour Studies Discussion Paper DP/200/2010, Geneva 2010, p. 29.

¹⁸ See Bruno Palier and Kathleen Thelen, ‘Institutionalizing Dualism: Complementarities and Change in France and Germany’, *Politics and Society*, vol. 38, no. 1, 2010; David Rueda, ‘Dualization, Crisis and the Welfare State’, *Socio-Economic Review*, vol. 12, no. 2, 2014.

¹⁹ In sub-Saharan Africa, only 3 per cent of workers are covered by unemployment benefits—as compared to 76 per cent in high-income countries: ILO, *World Employment Social Outlook: The Changing Nature of Jobs*, Geneva 2015, p. 80.

²⁰ See, respectively, the ILO’s *Key Indicators of the Labour Market*; and *Women and Men in the Informal Economy: A Statistical Picture*, 3rd edn, Geneva 2018, p. 23.

to worsening economic stagnation.²¹ Rather than being put out of work by the low demand for their labour, people are forced to work for lower than normal wages, and in worse than normal working conditions. Those who can't do so drop out of the labour force. Life in stagnant economies has thus come to be defined by intense employment insecurity, represented in a plethora of science-fiction dystopias populated by a redundant humanity.²² Under-employment is becoming a standard feature of labour markets, but one that lacks a standard form of expression. From the mid-60s onwards, as labour surpluses expanded globally, multinational firms began to engage in labour-market arbitrage, playing suppliers off against each other to obtain productive labour at low prices, which they then used to compete in oversupplied global markets. Industrial firms have taken advantage of employment insecurity not only in low-income countries, but also in the high-income world, moderating workers' wage demands by creating multi-tiered contracts, or hiring workers outside the bounds of standard labour law.

Yet only about 17 per cent of the global labour force works in manufacturing, with an additional 5 per cent in mining, transportation and utilities.²³ The vast majority of the world's under-employed workers therefore end up finding jobs in the highly heterogeneous service sector, which accounts for between 70 and 80 per cent of total employment in high-income countries, and the majority of workers in Iran, Nigeria, Turkey, the Philippines, Mexico, Brazil and South Africa.²⁴ The post-industrial economy we have inherited—now finally on a world scale—is, however, rather unlike the one whose emergence Daniel Bell first predicted in 1973: instead of an economy of researchers, tennis instructors and Michelin-rated chefs, ours is predominantly a world of side-street barbers, domestic servants, fruit-cart vendors and Walmart shelf-stackers.²⁵

²¹ Some automation theorists do identify under-employment as a common feature of contemporary economies, but they have trouble explaining it, focused as they are on the apparent dynamism of technological change. See, for example, Stern, *Raising the Floor*, p. 185; Yang, *The War on Normal People*, pp. 79–80.

²² Examples of such dystopian visions include Alfonso Cuarón's *Children of Men* (2006) and Neill Blomkamp's *District 9* (2009) and *Elysium* (2013), as well as the Brazilian TV series *3%* (2016), created by Pedro Aguilera.

²³ ILO, *Key Indicators of the Labour Market*. Of that 17 per cent, a sizable fraction are informally employed, engaging in domestic industry: producing bricks, cigarettes, locks and shoes in tiny household or backyard shops and foundries.

²⁴ According to the ILO, service workers came to represent the majority of the global labour force in 2015: *Key Indicators of the Labour Market*.

²⁵ Daniel Bell, *The Coming of Post-Industrial Society*, New York 1973.

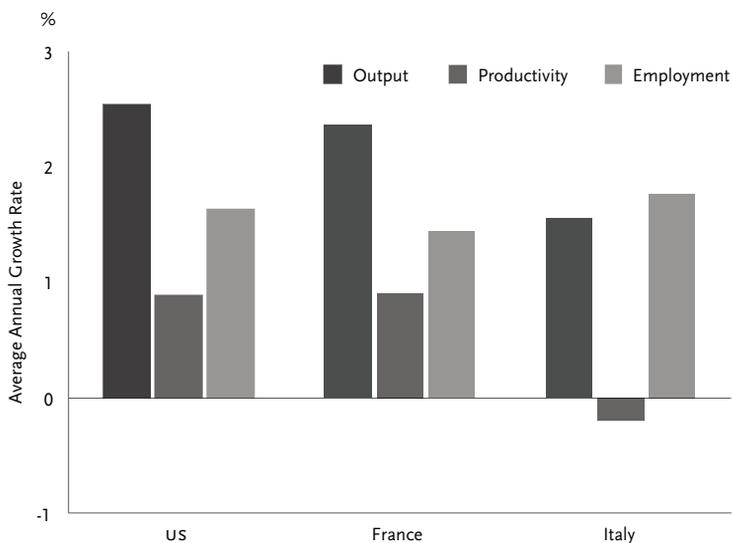
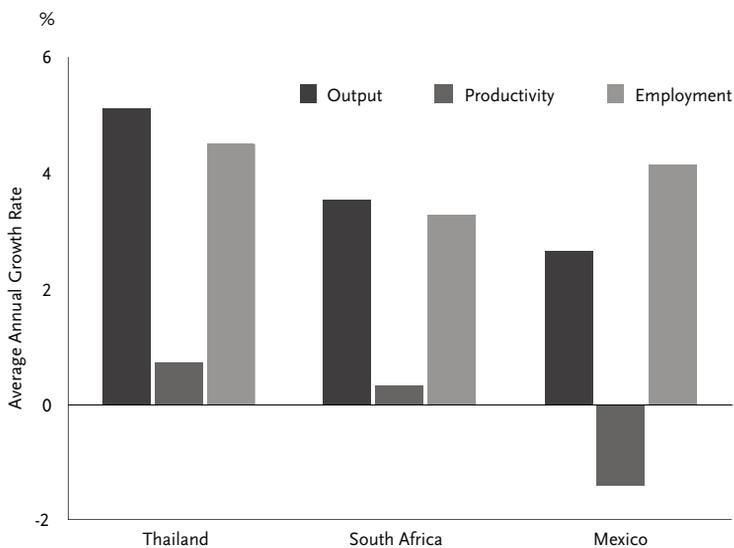
The basic pattern of employment growth in services, described by Princeton economist William Baumol in the early 1960s, helps explain why under-employment in the sector is such a major feature of today's economy—and why the automation theorists' account falls askew.²⁶ Baumol explained rising service-sector employment by pointing out that service occupations see lower rates of mechanization and productivity growth than the industrial sector. If demand for services increases, employment does too, and by almost as much (Figures 2 and 3)—unlike in manufacturing, where most output growth is generated by rising productivity rather than expanding employment. Of course, some services, like wholesale trade, see spurts of rapid productivity growth, but these fail to coalesce in the sustained, sector-wide productivity growth of the sort that was endemic to manufacturing over the long history of its industrial development.

Since services cannot rely on price effects for expanding demand—that is, rising productivity leading to falling prices and hence to increased demand—we should expect service-sector employment to grow slowly. As Baumol showed, service-sector prices suffer from a 'cost-disease': sluggish rates of productivity growth mean that services become ever more expensive relative to goods.²⁷ Service-sector demand must thus rely on income effects for its expansion—the growth of demand for services depends on the growth of incomes across the wider economy. This means that as the rate of overall economic growth slows with the dilapidation of the industrial growth-engine, the pace of service-sector employment growth should slacken, too.

But despite advanced economies growing more slowly, service-sector employment expanded quickly in certain low-wage, precarious occupations. It is at this point that logics of under-employment come into play. It turned out to be possible to lower the prices of these services—and so to expand demand for them—without raising levels of productivity, by

²⁶ See William Baumol, 'Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis', *American Economic Review*, vol. 57, no. 3, June 1967, pp. 415–26, as well as William Baumol et al., *Productivity and American Leadership: The Long View*, Cambridge MA 1989.

²⁷ According to Baumol, it is actually the falling price of manufactures that makes services seem to be growing more expensive. The theory that changes in relative prices are determined by differential rates of labour-productivity growth was the original intuition behind the labour theory of value. See Adam Smith, *Wealth of Nations*, New York 2000, pp. 73–4.

FIGURE 2: *Service Sectors in the US, France and Italy, 1980–2010*FIGURE 3: *Service Sectors in Thailand, Mexico and South Africa, 1980–2010*

Source: Groningen Growth and Development Centre, 10-Sector Database, January 2015 edition.

paying workers less, or suppressing the growth of their wages relative to whatever meagre increases in their productivity were achieved over time.²⁸ The same principle applies to self-employed workers, who, by offering to work for less, are able to create demand for their labour at the expense of their incomes. The service sector is the choice site for job creation through super-exploitation because the wages of service workers make up a relatively large share of their final price. Particularly in low- and medium-income countries, productivity growth in many services has been negative, as people contrive work for themselves via involutionary job-creation strategies. The extent to which firms are allowed to take advantage of such income-insecure workers depends on each country's labour-protection laws.

As under-employment rises, inequality must intensify. Masses of people can only work as long as the growth of their incomes is suppressed relative to the average rate.²⁹ The consequence is an expanding gap between the growth of real wages and that of productivity levels, contributing to the 9 per cent shift from labour to capital incomes in the G20 countries over the past fifty years. Worldwide, the labour share of income fell by 5 per cent between 1980 and the mid-2000s, as a growing portion of income growth was captured by a tiny class of wealth-holders.³⁰ In fact, increases in inequality are worse than these statistics suggest, since the distribution of labour income has itself become more unequal, with the largest pay rises going to managers. According to a recent study, between the late 1980s and the early 2010s, labour productivity grew faster than average wages, which in turn grew faster than median wages across the

²⁸ For a similar explanation, see Torben Iversen and Anne Wren, 'Equality, Employment and Budgetary Restraint: The Trilemma of the Service Economy', *World Politics*, vol. 50, no. 4, 1998.

²⁹ As David Autor and Anna Salomons note in their criticism of the automation discourse, 'labour displacement need not imply a decline in employment, hours or wages', but can hide itself in the relative immiseration of the working class, as 'the wage bill—that is, the product of hours of work and wages per hour—rises less rapidly than does value added': 'Is Automation Labour-Displacing? Productivity Growth, Employment and the Labour Share', *Brookings Papers on Economic Activity*, 2018, pp. 2–3.

³⁰ ILO and OECD, 'The Labour Share in the G20 Economies', Report prepared for the G20 Employment Working Group, February 2015, p. 3. IMF, *World Economic Outlook*, 2017, Washington DC 2017, p. 3. See also Loukas Karabarbounis and Brent Neiman, 'The Global Decline of the Labour Share', *Quarterly Journal of Economics*, vol. 129, no. 1, 2014.

OECD.³¹ As inequality intensifies, opportunities for super-exploitation expand; it begins to make sense for richer households to hire the poor to perform tasks they would otherwise do for themselves—solely because of the extreme difference in the price of their respective labours.

These trends suggest that the apocalyptic crisis of labour-market dysfunction that automation theorists anticipate will not take place. Instead, unemployment will continue to spike during downturns and then give way to under-employment and rising inequality. In *Rise of the Robots*, Martin Ford's worst nightmare would be if the 'economic system eventually manages to adapt to the new reality' of labour displacement, but in truth, it has. As Mike Davis put it, the 'late-capitalist triage of humanity' has 'already taken place'.³² Unless halted by concerted political action, the coming decades are likely to see more of the same: overcapacity in international markets for agricultural and industrial products will continue to push workers out of those sectors and into services, which will see its share of global employment climb from 52 per cent today to 70 or 80 per cent by mid-century. Since overall rates of economic growth are set to remain low, the service sector will absorb job losers and new labour-market entrants only by increasing income inequality.

This is not to say that the poor will get poorer, but that their share of income growth will remain much smaller than their share of the population. As Thomas Piketty and his colleagues have shown, incomes for the poorest half of the global population doubled between 1980 and 2016 (though rising by only a tiny amount in absolute terms), but that accounted for only 12 per cent of overall income growth; the richest one per cent captured more than twice that share—27 per cent—over the same period.³³ Barring a shift in labour's ability to press its interests, containing economic inequality will depend on the strength of welfare-state institutions. So far, these have tended to give way in the face of economic stagnation. In sluggish economies periodically wracked by austerity, it is

³¹ Andrew Sharpe and James Ugucconi, 'Decomposing the Productivity-Wage Nexus in Selected OECD Countries, 1986–2013', in OECD, *International Productivity Monitor*, no. 32, 2017, p. 31.

³² Ford, *Rise of the Robots*, p. 219; Mike Davis, *Planet of Slums*, London and New York 2006, p. 199.

³³ Facundo Alvaredo et al., eds, *World Inequality Report 2018*, Cambridge 2018, p. 52. Some portion of the income gains of the poorest 50 per cent was eaten up by higher living costs in cities, which are notoriously difficult to measure; urbanization increased from 39 to 54 per cent over the same period.

easier to blame the resulting social deterioration on vulnerable sections of the workforce—immigrants, women, racial and religious minorities—than to unite around a new, emancipatory social project.

2. A SILVER BULLET?

The automation discourse has identified a set of troubling tendencies in the world economy associated with a persistently low demand for labour. The social crisis entailed by this long-unfolding trend is worse than the statistics indicate. Growing numbers find themselves excluded from meaningful participation in the economy and from the sense of power and purpose that it affords, even under the adverse conditions of capitalist societies. Atomization, amplified by job insecurity and inequality, renders people susceptible to the appeal of economic nationalism, which claims to solve globalization's problems by putting 'our country first'. Automation theorists are attentive to these dangers; the morbid symptoms of a decline in the demand for labour will not be alleviated by tariff barriers or job-training facilities.³⁴ Measured against the slow-burning catastrophe of the present era, such bromides offer little hope. The automation theorists therefore attempt a radical rethink. In this respect, automation is a lot like global warming: when people take it seriously, they find themselves willing to consider revisions to the basic structure of social life that they otherwise would have thought impossible. Naming the present world as obsolete, the automation theorists dream up radical ways to resolve the crisis of the world of work. Their solutions are worth considering, even if, as I have been arguing, they are wrong about its causes.

The automation theorists' principal proposal is a universal basic income: a no-strings-attached income paid to every citizen.³⁵ Set at a high enough level, UBI would end poverty outright. A UBI would provide workers in

³⁴ See *inter alia* Darrell West, *The Future of Work: Robots, AI and Automation*, Washington DC 2018, p. 139; Yang, *War on Normal People*, pp. 150–61, 75–7; Eduardo Porter, 'Is the Populist Revolt Over? Not If Robots Have Their Way', *NYT*, 30 January 2018; Ford, *Rise of the Robots*, pp. 249–52.

³⁵ See Philippe van Parijs and Yannick Vanderborght, *Basic Income: A Radical Proposal for a Free Society and a Sane Economy*, London 2017, p. 8; Guy Standing, *Basic Income: A Guide for the Open-Minded*, London 2017. This proposal is discussed in Brynjolfsson and McAfee, *Second Machine Age*, pp. 232–41; Ford, *Rise of the Robots*, pp. 257–9; Stern, *Raising the Floor*, pp. 171–222; Yang, *War on Normal People*, pp. 165–74.

insecure employment with a measure of security, a crucial reform in an era of low labour demand and mass under-employment. On the basis of these arguments, automation theorists often present UBI as a neutral policy instrument—appealing to left and right—which solves the problem of global unemployment, just as the Green Revolution technologies were supposed to solve the problem of global hunger. Of course, such technocratic neutrality is a fantasy: depending on the manner in which it is implemented, UBI will lead in radically different directions, most of which will not bring us closer to a world of human flourishing.³⁶

UBI proposals predate the advent of the automation discourse. Some trace their origin to Thomas Paine, who argued as early as 1797 that a lump-sum payment should be distributed to all individuals on reaching the age of majority.³⁷ Paine justified this coming-of-age grant along classically Lockean lines: it would enable everyone to participate in market exchange, securing the moral foundations of a private-ownership society. Twentieth-century neoliberal economists supported a basic income for similar reasons. Milton Friedman argued for negative income taxes as a replacement for welfare-state programmes: instead of funding public projects aimed at reducing poverty, each person should be given enough to raise them above the poverty line.³⁸ Today, the most fulsome neoliberal arguments for UBI are to be found in the writings of Charles Murray, who believes it will halt the decline of the West and restore its tired souls to Christian faith and monogamous marriage. The cash—\$1,000 a month—will be freed up by liquidating most of the welfare state.³⁹ Murray's advocacy of UBI stems from his belief that welfare-state institutions are not only economically inefficient but

³⁶ This point is recognized in Dyer-Witheford, *Cyber-Proletariat*, pp. 185–6; Srnicek and Williams, *Inventing the Future*, p. 127; Annie Lowrey, *Give People Money: How UBI Would End Poverty, Revolutionize Work and Remake the World*, New York 2018. p. 130.

³⁷ On Thomas Paine's *Agrarian Justice* (1796), see Van Parijs and Vanderborcht, *Basic Income*, pp. 70–2.

³⁸ Milton Friedman, *Capitalism and Freedom*, London 1962, pp. 191–5. See also Friedrich Hayek, *Law, Legislation and Liberty*, vol. 3, London 1979, pp. 54–5.

³⁹ Charles Murray, *In Our Hands: A Plan to Replace the Welfare State*, Washington DC 2016, pp. 11–5; and *Coming Apart*, New York 2012. On Murray's intellectual trajectory, see Quinn Slobodian and Stuart Schrader, 'The White Man, Unburdened', *Baffler*, no. 40, July 2018. It's striking how many liberal and even left proponents of UBI have been influenced by Murray's work. See Brynjolfsson and McAfee, *Second Machine Age*, pp. 234–7; Ford, *Rise of the Robots*, pp. 262–3; West, *Future of Work*, pp. 99–100; Lowrey, *Give People Money*, pp. 128–30. Andy Stern even narrates a fictional conversation between Murray and Martin Luther King: *Raising the Floor*, pp. 202–3.

soul-destroying—entailing the alienation of essential sources of individual meaning-making to the state. He argues that social problems like poverty and drug addiction should be handled directly by the communities in which they arise through ‘voluntary associations’, which UBI would support by providing a social wage sufficient to ensure that no one went hungry, and by dismantling the institutions that presently shoulder these burdens.⁴⁰ In Murray’s vision, UBI would remain fixed at a low level. Further income redistribution would be blocked, so inequality would continue to soar. Murray’s proposal for a UBI is a disturbing vision of how an ever more unequal society, marked by a persistently low demand for labour, might render this situation palatable to the poorer among its members. His platform stands at the base of much of the right-wing automation discourse’s policy proposals.⁴¹ A danger is that, in its implementation, UBI may come to look more like this right-wing version than like left-wing alternatives.

Left-wing UBI proposals would maintain or expand social provision, so their version would be far more expensive. From a centre-left egalitarian position, Philippe van Parijs, perhaps UBI’s most respectable advocate, wants to provide people with enough to meet their basic needs, without dismantling the welfare state. He and Yannick Vanderborght aim at 25 per cent of GDP per capita—roughly \$15,500 per year for each person in the US in 2019. To make this more palatable, however, they recommend starting payments at a very ‘modest level’ and not on a universal basis: there would be a ‘participation condition’, such as a community-service requirement, and eligibility restrictions, to prevent ‘selective immigration’ to UBI countries. The claim is that even small monthly payments will begin to revitalize communities, thereby becoming the basis of a powerful push for higher levels of UBI, or alternatively, for higher wages.⁴²

⁴⁰ Murray, *In Our Hands*, pp. 60–8, 81–90.

⁴¹ See Brynjolfsson and McAfee, *Second Machine Age*, pp. 234–7; Ford, *Rise of the Robots*, pp. 262–3; West, *Future of Work*, pp. 99–100; and Lowrey, *Give People Money*, pp. 128–30.

⁴² See Van Parijs and Vanderborght, *Basic Income*, pp. 11–12, 214, 220–4, 127–8; see also Erik Olin Wright, *How to Be an Anti-Capitalist in the 21st Century*, London and New York 2019, pp. 74–5. For an earlier version of this argument, see Stanley Aronowitz et al., ‘The Post-Work Manifesto’, in Stanley Aronowitz and Jonathan Cutler, eds, *Post-Work: The Wages of Cybernation*, London 1998.

Meanwhile, for anti-capitalist automation theorists like Nick Srnicek and Alex Williams, UBI opens the more radical possibility of facilitating a painless shift towards full unemployment—to life beyond wage labour.⁴³ As automation advances, the value of the UBI will rise until the power to purchase most goods and services is provided by this alternative distribution mechanism—a radical advance in equality. In *Inventing the Future*, UBI is held up as a way to accelerate the transition to a fully automated world, since a high minimum-income floor will empower workers to refuse work, which in turn incentivizes employers to make jobs enjoyable, or to automate them out of existence.⁴⁴ UBI thus becomes a means not of stabilizing the late-capitalist economy, but of pushing towards a post-scarcity world, in which the ‘economic problem’ has been solved and people are free to pursue their passions. Past that point, the major questions concern humanity’s ultimate horizon. Does freedom from work mean indulging in hobbies, as Keynes imagined, or building spaceships and exploring the stars?⁴⁵

Limitations

In its egalitarian forms, UBI has many attractive aspects. Even a minimal net redistribution can be welcomed on its own terms, above all if it goes some way to alleviate the stress of poverty and its associated mental and physical ailments. Combined with a global carbon tax, UBI could play a role in mitigating climate change, providing a partial panacea for the job losses incurred through a transition to renewables.⁴⁶ To evolve from a technocratic fix to an emancipatory project, however, UBI would have to do more: it would have to empower individuals to fight for dramatic social change.

⁴³ Srnicek and Williams, *Inventing the Future*, pp. 107–27.

⁴⁴ Srnicek and Williams, *Inventing the Future*, pp. 117–23. For the original version of this argument, see Robert J. van der Veen and Philippe van Parijs, ‘A Capitalist Road to Communism’, *Theory and Society*, vol. 15, no. 5, 1986. See also Frase, *Four Futures*, pp. 54–8.

⁴⁵ Keynes, ‘Economic Possibilities for Our Grandchildren’ (1930), in *Essays in Persuasion*, London 1963, pp. 366–7; West, *The Future of Work*, pp. 83–8. See also Saadia, *Treconomics*, as well as Iain M. Banks’s *Culture Series*. The popularity of the ‘fully automated luxury communism’ meme speaks to this appealing vision.

⁴⁶ Alyssa Battistoni, ‘Alive in the Sunshine’, *Jacobin*, 12 January 2014; Van Parijs and Vanderborght, *Basic Income*, pp. 227–30.

There are reasons to doubt that UBI will have that effect. To begin with the flourishing communities that UBI proponents invoke: in itself, giving people money will not revitalize communities. As Marx and Engels argued in the *Communist Manifesto*, the expansion of the cash economy tends to melt ‘all fixed, fast-frozen relationships’ into air. This is because money allows people to meet their needs without relying on the communities of which they form a part; it therefore tends to erode their collective organizational capacities. Today, transportation, entertainment and nourishment have been entirely reshaped in line with this inner logic of market economies. People spend hours a day in traffic on their way to and from work—together but fundamentally alone—eating McDonalds and watching cat videos on their phones. Economies already designed to reduce everyone to an atomic existence could easily accommodate a UBI. What of the further claim that a UBI would empower workers in confrontations with their bosses? This is putting the cart before the horse: in order to win a UBI large enough to alter social relations, workers would first need to be empowered. A still deeper concern is that, even if UBI did give people a greater capacity to stand and fight, it is not clear that it presents a viable pathway toward broader emancipatory goals.

For UBI to serve as the basis of a left-wing vision of exit from capitalism, the automation theorists’ analysis would need to be correct: today’s persistently low labour demand would have to originate in rapidly rising productivity levels, associated with a fast pace of economic change. Were that the case, the main issue society would confront would be rising economic inequality, which would be rectified by distributing more and more income as UBI payments, rather than as wages. If instead, as I have argued, contemporary under-demand for labour is the result of global overcapacity and depressed investment—driving down rates of overall economic growth—then waging such a distributional struggle would quickly become a zero-sum conflict between labour and capital, blocking or at least dramatically slowing progress towards a freer future. As such, we would need a plan for wresting control over the economy away from asset owners, yet UBI proposals say little about how to reduce capital’s sway over production.

While a UBI has the laudable goal of separating the income people get from the amount of work they do, it would do nothing to alter the relation between income and assets, keeping us tethered to a system in which interest from extending credit, rent from leasing land or homes,

and profit from running businesses constitute a sizeable fraction of total income. The profit motive would remain the driving force of the economy because capitalists would retain their power over investment decisions, which would continue to determine whether the economy grows or shrinks. Capital would thus continue to wield the weapon of the *capital strike*, i.e. the prerogative of owners of capital to throw society into chaos via disinvestment and capital flight.⁴⁷ For forty years, in an environment of worsening overcapacity and slowing economic growth, capitalists have threatened the use of this weapon to force political parties to capitulate to their demands: for looser business regulations, laxer labour laws, and, in the midst of economic crises, for private bailouts and public austerity.

A left that wants to use UBI to usher in a different sort of world would therefore need to present us with its Meidner Plan, bringing about the progressive socialization of the means of production via a planned transfer of asset ownership to society at large.⁴⁸ The problem is that it was precisely the threat of capital disinvestment during the crisis of the 1970s that led to the original Meidner Plan in Sweden being cast aside. Such a plan would be even harder to realize today, when mass working-class organizations are much weaker and economic growth slower. Given this context, in which a capital strike would quickly push the economy deeply into crisis, we need to set our sights higher: on the conquest of production. Taking the power to control investment decisions away from capitalists and rendering the capital strike inoperative forms an essential precondition of our collective progress toward a post-scarcity future.

3. NECESSITY AND FREEDOM

Even if we doubt automation theorists' account of technological progress—as I certainly do—the attempt to imagine and chart a path toward a post-scarcity future remains an attractive and valuable aspect

⁴⁷ See James Crotty, 'Post-Keynesian Economic Theory: An Overview and Evaluation', *American Economic Review*, vol. 70, no. 2, 1980, p. 25; Adam Przeworski, 'Social Democracy as Historical Phenomenon', *NLR* 1/122, July–August 1980, pp. 56–8; Jonathan Levy, 'Capital as Process and the History of Capital', *Business History Review*, vol. 91, no. 3, 2017.

⁴⁸ See Bertram Silverman, 'The Rise and Fall of the Swedish Model: Interview with Rudolf Meidner', *Challenge*, vol. 41, no. 1, 1998.

of the left-wing automation discourse, allowing us to pose the question of how the pieces of this defunct world can be reassembled to break through to a new mode of social existence. Harboursing a vision is crucial to reviving an emancipatory project today, not least because its future realization seems so far away. Nineteenth-century socialists knew they were far from achieving their goals, but they were nevertheless possessed by an idea of a freer future which animated their struggle. As late as 1939, Brecht could still write: ‘our goal lay far in the distance / it was clearly visible’.⁴⁹ Few would say that today. Not only are we living in an era of stubbornly entrenched neoliberalism, provoking angry ethno-nationalisms and climate-induced catastrophes of growing frequency and scale, we also lack a concrete idea of a real alternative. Centralized state planning turned out to be both economically irrational and ecologically destructive, filling warehouses with shoddy products and proving susceptible to autocratic bureaucratization. European welfare states and Keynesian full-employment policies proved unable to adapt to a context of slowing growth and ongoing deindustrialization.⁵⁰

This is one reason why socialist reforms have given way to neoliberal ones, while emancipatory social movements have mainly been limited to rear-guard defences, which will merely slow our slide into the abyss. So, ‘demand the future’ indeed, but which one? It is striking that *Star Trek: The Next Generation* provides the go-to example of a freer future for so many automation theorists. In this series-reboot from the late 1980s, a technology called the ‘replicator’—essentially an amazingly advanced three-dimensional printer—brings about the end of economic scarcity, allowing people to live in a world without money or markets.⁵¹

⁴⁹ Bertolt Brecht, ‘To Those Born After’, in *The Collected Poems of Bertolt Brecht*, London 2019, p. 736.

⁵⁰ On the limits of actually existing welfare states, as explained by one of their great defenders, see Gøsta Esping-Andersen, *The Three Worlds of Welfare Capitalism*, Princeton 1990, pp. 9–34.

⁵¹ See Ford, *Rise of the Robots*, pp. 246–8; Yang, *War on Normal People*, p. xvii; Frase, *Four Futures*, pp. 48–9. For an extended discussion, see Saadia, *Treconomics*, pp. 65–86. This vision may have found its inspiration in the USSR. In 1961, Khrushchev called for communism in 20 years. Sci-fi duo the Strugatsky brothers penned a series of incredible short stories in response entitled *Noon: 22nd Century* (1961), describing space exploration in a communist future. Alongside their later novel, *Hard to Be a God* (1964), this vision of space-faring communists perhaps served as a model for *Star Trek* and for Bank’s *Culture Series*, both of which premiered in 1987.

The question is: can we envisage a post-scarcity world without the replicators—that is, even if full automation turns out to be a dream?

By side-lining the conquest of production as a goal, automation theorists have largely abandoned what has been seen as the basic precondition for generating a post-scarcity world, from Thomas More's 1516 *Utopia* to present-day Trekonomics: not the free giving of money, as the automation theorists have it, but rather the abolition of private property and monetary exchange.⁵² One of the reasons for their relinquishing this key objective is that they tend to begin from the wrong transitional questions: starting from the assumption that full automation will be achieved, they go on to ask how we would need to transform society in order to save humanity from the mass joblessness it would cause and create a world of generalized human dignity. But it is possible to reverse this thought experiment, so that instead of presupposing a fully automated economy and imagining the possibilities for a better and freer world created out of it, we begin from a world of generalized human dignity and then consider the implications for technical change in working to realize that world.

What if everyone in the world suddenly had access to enough health-care, education and welfare to reach their full potential? A world of fully capacitated individuals would be one in which every single person could look forward to developing their interests and abilities with full social support. What would have to change in the present for this future scenario to materialize? In a fully capacitated world, everyone's passions would be equally worthy of pursuit. Particular individuals would not be assigned to collect garbage, wash dishes, mind children, till the soil or assemble electronics for their entire lives, just so others could be free to do as they please. Instead of pushing some people down 'under the mudsill' in order to raise up the rest, as the South Carolina slave owner James Henry Hammond once put it, we would need to find another way to allocate the necessary labours that serve as the foundation for all our other activities.⁵³

⁵² Thomas More, *Utopia*, 2nd edn, London 2014, pp. 47, 132.

⁵³ For Hammond's 1858 mudsill theory, which claimed it was necessary to have slaves for drudgery, so the rest of society could be raised above the muck, see Elizabeth Anderson, *Private Government*, Oxford 2017, pp. 30–1. See also W. E. B. Du Bois's evocative response to the mudsill theory in *Darkwater: Voices from Within the Veil*, Mineola 1999.

Whereas automation theorists place their hopes in technology, many of the original theorists of post-scarcity—such as More, Cabet, Marx, Kropotkin—did not need to call on a *deus ex machina* to solve this riddle. They claimed that post-scarcity was possible without the full automation of production. Instead, we needed to conceive of social life as comprising a realm of necessity and a realm of freedom.⁵⁴ In the former, we would share out the labours necessary for our collective reproduction, dividing up responsibilities while taking into account individual abilities and proclivities. Some tasks would need to be performed locally, but many could be planned on a regional or global scale. Of course, much necessary work is difficult to share out widely because it requires specialized skills: we would still need farmers, construction workers, surgeons, electricians and machinists—though in a fully capacitated world, these specialisms would themselves be more evenly distributed. Perhaps, alongside a common rotation, each individual would choose a vocation that would be added to their responsibilities.

The result of such work-sharing would be that more people, including those currently cast aside as redundant workers, would participate in necessary work, and so the amount any one person had to do would be correspondingly reduced. In order to share these necessary labours at all, however, their character would need to be transformed. Social distinctions between waged and unwaged work, which have historically consigned women to the ‘hidden abode’ of household production, would have to be abandoned. Moreover, production and consumption would need to be conceived as a closed loop, rather than endpoints cut off from other social-ecological considerations.⁵⁵

⁵⁴ See More, *Utopia*, pp. 60–72; Etienne Cabet, *Travels in Icaria*, Syracuse 2003, pp. 80–9; Karl Marx, *Grundrisse: Foundations of a Critique of Political Economy*, London 1993, pp. 707–12; Karl Marx, *Capital*, vol. 3, London 1991, pp. 958–9; Peter Kropotkin, *The Conquest of Bread*, London 2015, pp. 99–112. For a general discussion, which, however, excludes Cabet and Kropotkin, see Edward Granter, *Critical Theory and the End of Work*, Farnham 2009, especially pp. 31–67. Here I leave to one side thinkers like Charles Fourier, William Morris and Herbert Marcuse who essentially suggested that the collapse of spheres could be achieved by turning all work into play. Single-realm conceptions of a post-scarcity world are, in my view, both totalitarian and hopelessly utopian.

⁵⁵ ‘Putting an end to garbage collection as a job some have to do for years, will be a lot more than job rotation: it will imply changes in the process and logic of garbage creation and disposal’: Gilles Dauvé, *Eclipse and Re-Emergence of the Communist Movement*, Oakland 2015, p. 54.

How a fully capacitated humanity would then set about further transforming their common labours becomes an open question. Here, it is important to recall that the technologies developed in capitalist societies are not neutral: they are designed to embody capitalist control, not to free humanity from drudgery; we probably have the technological capability to make many tasks more enjoyable than they currently are. Technical know-how might be applied to break down distinctions between skilled and unskilled labour, or to eliminate some kinds of labour altogether. Such questions would be settled by human beings freely and collectively figuring out what they wanted to do, rather than decided for us by supposedly unstoppable technological forces.⁵⁶

Note that what I am here calling necessary or reproductive labour is not necessarily unsatisfying work, especially if it is apportioned in such a way that no one's working life is entirely dominated by it. Minding children, for example, is not only good for children, but for adults too, opening them to the wonders of a child's experience of the world; likewise, making dinner or washing dishes, when done collectively, can facilitate the forming or deepening of relationships. Whether a fully capacitated humanity would prefer such activities to be performed by food replicators and cleaning drones, so people can get on with their scientific research unimpeded, remains to be seen.

In the post-scarcity tradition, the reorganization of necessary labours makes possible a world of free giving. Everyone can go to the social storehouses and service centres to get what they need, while—as More put it—'giving absolutely nothing in exchange'.⁵⁷ All are entitled to food, drink, clothes, housing, healthcare, education and to means of transportation and communication, irrespective of their contribution to the labour of necessity, 'just as all men' are 'entitled to warm themselves in the heat of the sun'—although ecological sustainability would set constraints on their provision.⁵⁸ Literal abundance is not required so long

⁵⁶ Instead of ending our social obligations to one another, as the automation theorists think possible, the point is to recognize and transform them—to dis-alienate communities rather than be done with them—as a way to ensure that individual freedom is shared equally and by all. This is not to champion drudgery and its associated work ethic, but to recognize that drudgery is unlikely to go away.

⁵⁷ More, *Utopia*, pp. 67–8. See also Kropotkin, *Conquest of Bread*, pp. 58–63.

⁵⁸ James Boggs, 'The American Revolution' [1963], in Stephen Ward, ed., *Pages from a Black Radical's Notebook: A James Boggs Reader*, Detroit 2011, p. 110.

as scarcity and its accompanying mentality are overcome, so that people can 'live with a joyful and tranquil frame of mind, with no worry about making a living'.⁵⁹ Indeed, according to this perspective, abundance is not a technological threshold but a social relationship, undergirded by the principle that one's means of existence will not be at stake in any of one's relationships. Likewise, in a post-scarcity world, there could still be sanctions to ensure the necessary work is actually undertaken. These would take the form not of threats of starvation and exclusion, but of invitations to cooperation.⁶⁰

For theorists of post-scarcity, this reconstruction of the realm of necessity is not an end in itself; the solidarity it engenders also expands the realm of freedom, and ensures this too is shared by all.⁶¹ Under these conditions, once necessity is assured, everyone is free to develop their individuality, outside the bounds of any given community. The point is to enable by way of a collective social project what the automation theorists hope to achieve technologically. Of course, the realm of freedom is about time for both socializing and solitude, for both engaging in hobbies and doing nothing at all—'*rien faire comme une bête*, lying on water and looking peacefully at the sky'.⁶² Adorno's phrase is suggestive of a world in which dispossession and the existential insecurity to which it gives rise have been universally abolished. None of this requires that we assume a spontaneous harmony of interests, or a benign human nature. On the contrary, ending economic compulsions implies that many people will be free to withdraw from oppressive personal relationships within households or workplaces, or to re-negotiate their terms.

⁵⁹ More, *Utopia*, p. 130.

⁶⁰ Economists have long recognized that hunger is not a good motivator: 'the best situation for man is when he produces in freedom, has choice in his occupations, has no overseer to impede him, and when he sees his work bring a profit to himself and others like him', with the result that 'well-being has always been the most powerful stimulant to work': Kropotkin, *Conquest of Bread*, pp. 138–9.

⁶¹ In that sense, 'equality enables—rather than detracts from—individualism': Kristin Ross, *Communal Luxury: The Political Imaginary of the Paris Commune*, London and New York 2015, p. 108. Ross's text evokes a form of 'luxury communism' that need not be 'fully automated'. See also More, *Utopia*, pp. 61–2; Marx, *Grundrisse*, pp. 711–2; Marx, *Capital*, vol. 1, pp. 532–3; and Kropotkin, *Conquest of Bread*, pp. 99–112.

⁶² Theodor Adorno, *Minima Moralia: Reflections from Damaged Life*, London and New York 2005, p. 157.

What will people do with their expanded free time? Post-scarcity has been called ‘post-work’, but such a perspective is inadequate.⁶³ Reorganizing social life to reduce the role of necessary labour is not about overcoming work as such; it is about freeing people to pursue the sort of activities that cannot be described simply as either work or leisure. That might include painting murals, learning a language, building water slides—or discovering new ways to do common tasks to make them less time-consuming. It could mean writing novels, or self-reinvention through education or exploration. As automation theorists of both right and left envisage, the end of scarcity would enable many to enter into voluntary agreements and associations with others from all over the globe: joining consortia of mathematical researchers, clubs for inventing new musical instruments, or federations for building spaceships. ‘Creative minds and scientific aptitudes’ would no longer be ‘wasted due to accidents of birthplace, the bad luck of challenging circumstances, or the necessity to survive’.⁶⁴ Funding for research or art would also no longer be determined by the profit motive, or dictated by the interests of the wealthy.

How would people gain access to the resources they need to pursue their passions in the realm of freedom? Presumably many of these could be developed within the realm of freedom itself, through voluntary associations, and federation among them.⁶⁵ But these issues—as well as the related question of what counts as necessity and what as freedom—would be matters for a freed humanity to resolve for itself, politically. The world would be composed of overlapping partial plans, rather than a single central plan—a possibility within our grasp through the new digital means of communication.⁶⁶ Within this framework, one could

⁶³ See Aronowitz et al., ‘Post-Work Manifesto’.

⁶⁴ Saadia, *Treconomics*, p. 61.

⁶⁵ One might imagine that the realm of necessity would in some respects continue to function like a capitalist economy, with its attendant pressures to raise productivity, reduce labour time and re-allocate resources. However, without labour or other factor markets, it is more likely that the realm of necessity would change slowly, absorbing innovations from the realm of freedom over time. The practical implementation of these innovations might take a long time, requiring coordination among various committees that would likely be more concerned with getting chores done, than doing them better. In that case, the realm of freedom would be the one giving rise to dynamic transformation.

⁶⁶ See Evgeny Morozov’s discussion of Daniel Saros’s *Information Technology and Socialist Construction* (2014) in ‘Digital Socialism?’, NLR 116/117, March–June 2019.

imagine fully capacitated individuals arranging themselves in all sorts of ways: people might live in large communities or small ones; they might do a lot of work or a little, choosing instead to explore nature, society, their minds, the oceans or the stars; they might be happy on a hot planet or a cool one; in a world of relative resource scarcity or abundance—as long as certain fundamental conditions of sustainable material security were met.⁶⁷

The point of this exercise is to show that it is possible to design utopian thought experiments that revolve around and prioritize people, not technological progress. Recognizing the fundamental dignity of the seven billion-plus who make up humanity requires that we no longer agree to relegate some to a life of drudgery so that others may be free. It means sharing out the work that remains to be done in a technologically advanced society so that everyone has the right and the power to decide what to do with their time.

Agents of change

This brief sketch of a post-scarcity world can perhaps serve as a benchmark to evaluate the various pathways that are supposed to get us to that place. From this standpoint, it is clear that nothing about the way our world is presently organized will automatically lead there. Life expectancies, education levels and degrees of urbanization have risen dramatically over time, yet they remain highly unequal. Meanwhile, even in the richest countries most people are so atomized, materially insecure and alienated from their collective capacities that their horizons are stunted. If full automation can appear as both a dream and a nightmare, that is because it has no innate association with human dignity, and will not generate a post-scarcity world by itself. Nor will UBI. Perhaps if access to education and healthcare were dramatically widened, communities revitalized by cooperatively sharing the work necessary to their reproduction, and industries partially socialized, then a basic income could form one part of a larger project aiming at human freedom.⁶⁸ But the

⁶⁷ For an account of utopia amidst scarcity, see Ursula K. Le Guin, *The Dispossessed: An Ambiguous Utopia*, New York 1994, as well as Fredric Jameson's commentary on 'world reduction' in Le Guin's novels in *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions*, London and New York 2007, pp. 267–80. See also Frase, *Four Futures*, pp. 91–119.

⁶⁸ Most UBI theorists end up admitting this point. See, for example, Van Parijs and Vanderborght, *Basic Income*, p. 246.

path to a post-scarcity world could also take some other form entirely. Without a vision of this world, it is easy to get lost along the way.

If a post-scarcity world is not the inevitable product of technological advancement or technocratic reforms, then it can only come about under the pressure of social movements pushing for a radical restructuring of social life. One of the most disappointing aspects of the automation discourse is its tendency to underrate existing social struggles. In their 1985 article, ‘A Capitalist Road to Communism?’, Robert van der Veen and Philippe van Parijs supposed that, as ‘rapid labour-saving technical change’ combined with ‘constraints on economic growth’, rational human action ‘can be relied upon to generate, sooner or later’ forces demanding and implementing social change. Writing thirty years later, Nick Srnicek and Alex Williams despair of the forces that have been generated, which they describe as mere ‘folk politics’: people are reacting to the increasing complexity of the modern world, they say, by demanding a return to the simplicity of local communities engaging in face-to-face interactions.⁶⁹

Despair of the emancipatory potential of today’s social struggles is not unreasonable. It would take a massive and persistent mobilization to turn the tide of a truculent neoliberalism, yet the only movement with the size and strength to undertake this task—the historic labour movement—has been thoroughly defeated. Strikes and labour demonstrations are mainly defensive: workers fight to slow the pace of capital’s juggernaut and its drive for more austerity, labour flexibility and privatization, in response to an economic slowdown that never ends. The labour movement has never figured out how to respond to technologically induced job loss under conditions of slowing economic growth. As Wolfgang Streeck put it, ‘disorganized capitalism is disorganizing not only itself but its opposition as well’.⁷⁰ For this reason, the long descent into economic stagnation has not been accompanied by a renewal of mass working-class organizations.

Nevertheless, over ten years on from the 2008 crisis, political stasis appears to be cracking. Social struggles have unfolded on a scale not seen for decades. There have been waves of strikes and social movements

⁶⁹ Van der Veen and Van Parijs, ‘A Capitalist Road to Communism?’, pp. 652–3; Srnicek and Williams, *Inventing the Future*, pp. 9–13.

⁷⁰ Wolfgang Streeck, ‘How Will Capitalism End?’, *NLR* 87, May–June 2014, p. 48.

across five continents, from China to North Africa, Argentina to Greece, Indonesia to the US.⁷¹ Masses of people are once again joining work stoppages, occupations, blockades, riots and demonstrations, protesting against the morbid symptoms of a long-term decline in the demand for labour—inequality, employment insecurity, government corruption and austerity measures, as well as food, energy and transportation price-hikes. Protestors have come out *en masse* in response to police murders, which sparked the rage of those who would no longer stand for their lack of social recognition. To be sure, these explosive movements have so far lacked the staying power to force recalcitrant governments into retreat and have suffered reversals and defeats. But they have nevertheless broadened political horizons and radicalized a new generation of militants. Perhaps our era is like the mid-19th century—producing utopian visionaries, but also generating new constituencies for emancipatory social change. Objective features of the present period support this hypothesis: ours is the healthiest, most broadly educated, most urban and most connected population in world history. Literate and mobile people ‘will not accept a future of high inequality and stagnant growth’ on a planet with rising sea levels.⁷² Whether this will bring us closer to a freer future is an open question.

What is certain is that if the social movements of the present period do take hold as more permanent formations, they are unlikely to look like the labour movements of the past. Vast discontinuities separate our era from that time. The labour movements arose during a long period of industrialization, whereas we live in the post-industrial doldrums: ours will be a struggle over the consequences of industrialization’s end. This is not to deny the global economy’s continuing dependence on industrial production, or the existence of factory workers. But the declining share of manufacturing in total employment means that these workers no longer have the capacity to cast themselves as representatives of a more just and rational future order. Even countries like South Africa, South Korea and Brazil, which industrialized only recently and where manufacturing

⁷¹ Among texts that attempt to take stock of these movements as a whole, see Paul Mason, *Why It’s Still Kicking Off Everywhere: The New Global Revolutions*, London and New York 2013; Manuel Castells, *Networks of Outrage and Hope: Social Movements in the Internet Age*, 2nd edn, Cambridge 2015; Zeynep Tufekci, *Twitter and Tear Gas: The Power and Fragility of Networked Protest*, London 2017; Endnotes, ‘The Holding Pattern’, *Endnotes* 3, 2013; and Göran Therborn, ‘New Masses?’, *NLR* 85, Jan–Feb 2014.

⁷² Paul Mason, *Postcapitalism: A Guide to Our Future*, London 2015, p. 29.

workers were pivotal in the struggles for democracy in the 1970s and 80s, have long become majority service-sector economies.⁷³

This change in the composition of the labour force will reshape social movements today in essential respects. Though automation discourse tends to over-emphasize this trend, it is true that direct human labour plays a much smaller role in the core industries than it did before; as Marx predicted, it has largely been displaced as the primary productive force by scientific and technical knowledge, embodied in vast infrastructures mobilizing both natural forces and machines. Many workers have been cast aside, forced to give up much of their waking lives to dead-end service jobs in which labour productivity rises slowly. The dynamic struggles that animated earlier generations of workers over who should benefit from continual productivity growth therefore fail to take place. For most workers today, capital's compulsion to drive down production costs means only labour intensification without corresponding increases in pay.

Commentators have argued that however disaffected insecure workers become, they lack the power at the point of production necessary to press their demands.⁷⁴ Yet, as it turns out, in a world of lean, just-in-time production, organizing to blockade circulation in and around major cities can prove an effective tactic. An early example was given in the *piquetero* movement in Argentina: unemployed workers blockaded highways around Buenos Aires to demand better benefits.⁷⁵ Since 2011, this tactic has been sporadically adopted by workers in the US, France, Egypt and elsewhere.

In the autonomous spaces that can open up in the course of major struggles, questions of the nature and future of society are posed. Assemblies are generally open to all. Personal and intimate forms of coercion are not altogether absent, but there is a shared sense that everyone deserves a say in social affairs. Within occupations and on the frontlines of blockades, people do actually care for one another. They cook and clean and look after the children without expecting anything in return, although

⁷³ See Gay Seidman, *Manufacturing Militance: Workers' Movements in Brazil and South Africa, 1970–1985*, Berkeley 1994.

⁷⁴ See, for example, Kim Moody, *On New Terrain: How Capital is Reshaping the Battleground of Class War*, Chicago 2017.

⁷⁵ See Federico Rossi, *The Poor's Struggle for Political Incorporation: The Piquetero Movement in Argentina*, Cambridge 2017.

of course the materials they use to perform these tasks have generally been purchased within the normal course of the life they seek to disrupt by their actions. Such efforts do not merely indicate a cleaving towards a simpler life—whether in folk or *völkish* terms. Instead they point, however fitfully, towards a world of generalized human dignity, one with fewer borders and boundaries.

No matter how large they become, these protests have so far been unable to escape the limits of all struggles over the collective reproduction of the working class, whose deterioration, under the pressures of stagnating wages, employment insecurity and welfare-state retreat, has been extreme. These movements fail to rise from the level of *reproduction* to that of *production*, even when they call forth and combine with strikes in what remains of the industrial core. However much hope they inspire amidst the catastrophe of the present, mass, disruptive protests in our era have so far lacked a vision of a wholly different world—one in which the infrastructures of capitalist societies are brought under collective control, work is reorganized and redistributed, scarcity overcome through the free-giving of goods and services, and our human capacities correspondingly enlarged as new vistas of existential security and freedom are opened up.

Unless social struggles organize themselves around these historic tasks, they will not break through to a new synthesis of what it means to be a human being—in a world devoid of poverty and billionaires, of stateless refugees and detention camps, and of lives spent in drudgery that hardly offers a moment to rest, let alone dream. Movements without a vision are blind; but visionaries without movements are much more severely incapacitated. Without a massive social struggle to build a post-scarcity world, late-capitalist visionaries will remain mere techno-utopian mystics.