INTRODUCTION

There were earlier efforts (notably by Charles Babbage), but modern computing—computers as we know them—sprang from the minds of Alan Turing and John Von Neumann at the Institute for Advanced Study at Princeton less than a hundred years ago.

Computers at first were seen as a curiosity, and at best as a scientific tool. They were certainly not seen as "personal."

Legend has it that the then-boss of IBM, Thomas J. Watson, estimated worldwide demand toward the end of World War II at five computers. This sounds ridiculous, of course, but it is only fair to remind ourselves that the machines of which he was thinking were vast, expensive congregations of vacuum tubes that took up an entire floor of a building, bearing very little resemblance to the featherweight machines that we throw into a pocket or onto a wrist today.

If Watson (who died in 1956) could see the marvel of a machine that I hold in my hands now (upon one of which

this chapter is being written), he would be astounded, just as, no doubt, we will be by the next iteration of technological innovation—perhaps a nanocomputer small enough to be injected into the human body to perform biochemical procedures.

Even then, though huge and (from a modern perspective) primitive as they might have been, one could certainly argue that it was these new computers that truly won World War II. Without the intelligence gained from breaking German and Japanese codes, the war might easily have ended in a very different way.

Fifty years ago, we became focused on all the wonderful things technology could do for us—and technology has flowed like water ever since. Looking at our lives today, half a century later, the impact of his technology upon human existence defies estimation. Wartime code breaking, vital as it unquestionably was, constitutes merely the tip of what is today an immense iceberg.[1]

But this book is not really about technology. It is about power, efficiency, fragility, inequality, division, and economic rents, all of which are dramatically affected by technology. What this book is really about is society: about how it has changed and about what technology is enabling us to do to ourselves. Technology itself is neutral, of course. It can be

used for good or evil. Sometimes, though, figuring out which is which can be difficult.

Writing *The New Industrial State* in 1967, the economist John Kenneth Galbraith was incredibly prescient. Although not a technologist himself, Galbraith did foresee something that others missed: the extraordinary power that technology has to transform society wholesale by altering the basic fabric of our lives. Galbraith warned then that the global elite would be sure to use technology to accumulate both wealth and power. Of course, he was right. In the half-century since he published the book, they have done precisely that.

In the late 1970s, the vector of technological change experienced a fundamental transformation. In Galbraith's time, technological change was driven by hardware. Although hardware continues to improve (driven by the continuous improvements in semi-conductors), innovation is increasingly driven by software. Artificial intelligence, for example, is just software. And software is a mysterious art to all but a select few. Software innovation can be incredibly fast and performed by a team as small as one individual.

Just as the rise of the multinational corporation defined the world John Kenneth Galbraith explored in *The New*

Industrial State, our epoch is defined by technology—technology so omnipresent it has become as fundamental as our DNA.

Today we are living in the New Technology State.

Too Efficient

Classical and neoclassical economics have unquestionably had a great run. For well over two centuries, the basic principles set out by Adam Smith and David Ricardo have dominated western thought. Against the bulwark of capitalism, communism and socialism have failed every test. And yet (as the modern writer Thomas Piketty has noted) the body of theory that constitutes neoclassical economics is fundamentally a theory of inequality. It accepts inequality precisely because we increase the degree to which society as a whole can prosper by permitting it. We grow the whole cake to such a degree that even the smallest slices are larger than they otherwise would have been: a more unequal world is also a more prosperous world for everyone. A rising tide lifts all boats.

The conventional wisdom is that governments can redistribute income to compensate for this inequality, always provided that the taxes they impose do not overly

distort incentives—i.e., that they do not disrupt efficiency. However, as Galbraith taught, the conventional wisdom is almost always wrong.

Efficiency is the altar for classical economics. It is the holy grail. Pure economic efficiency entails all resources being optimally produced and then optimally distributed. Greater efficiency is always a good thing . . . at least in theory. Thus, to change the distribution of outcomes, one must accept lower overall output unless one can find a way to redistribute income without distorting incentives. This is a tough challenge and presents tough choices.

Neoclassical economics was born in an era of stagnation. Adam Smith published his great, foundational work *The Wealth of Nations* in 1776, when wealth was accruing on land but not on labor. His earlier book, *The Theory of Moral Sentiments*, spawns more subtle lines of inquiry, including one observation that bears repeating here: people want both to be loved and to be lovely. One may be wise to ask how technology has affected society's views on what it means to be lovely and how that in turn has affected the drive for efficiency.

During the final quarter of the eighteenth century and into the nineteenth, by contrast, there was massive and relatively rapid change. This change inevitably brought with it

enormous social disruption. I was asked in graduate school to name the most critical technology to the Industrial Revolution. Students rushed, of course, to suggest the steam engine, the cotton gin, or the Bessemer converter. However, to the professor, the answer had to do with another kind of gin altogether. It was the gin still. It was this, the professor argued, which made substantial social change and upheaval possible. It was simply impossible to brew enough beer each day to provide the necessary amount of alcohol to get everyone who wanted to get drunk drunk! While the other inventions did, of course, help enormously, they had negative consequences—consequences that needed to be alleviated by the alcohol.

The upheaval effected by modern technological change is equally pronounced. And we still have gin stills and plenty of other drugs, legal and otherwise—smartphones and social media are as addictive as many "psychoactive" chemical compounds. This book is about these changes, the changes that are taking place now. It is not about the technological detail—constantly changing as it is—but rather about technology's impact on society more broadly: its impact on our lives and how the world around us will transform utterly as a result of it. Much of this change is undoubtedly very beneficial. But not all of it. This book

will consider three negative longer-term effects of the contemporary upheaval.

Firstly, technology has made our economy too efficient, which necessarily reduces the robustness and resilience of markets. We have made ourselves fragile and our systems much more exposed to threats such as pandemic, war, or cybersecurity failure. Natural limits on the quality and availability of software talent make this inevitable. The drive for efficiency above all else has made our world much more complex, to the advantage of the few and the disadvantage of the many.

Secondly, and on that note, the vast economic "rents" have driven inequality to what many argue are socially damaging levels. To Ricardo, rents were incomes above what one could earn through labor, or incomes gleaned from scarcity. He was mainly focused on land. Ricardo had a simple solution for rents: tax them all away. The scarce assets today are often intangible, but that does not invalidate the point.

And thirdly, society is now so fractured—so deeply divided—that we now disagree perpetually, and we barely interact with those in other camps. The profound fissures within the political life of the US and the UK and other nations illustrate this all too clearly. This is an ugly part

of human nature, but technology has optimized the ability to leverage this ugliness by empowering narratives over facts. It may indeed have changed ugliness into the new meaning of lovely.