The economics of innovation, growth, and welfare is complicated. Academics like to make it even more so by adding layers of complexity and nuance. Some portray innovation as a linear process, others as a chaotic one. Some recommend policy that is transformative, mission-oriented, or finely tuned for specific local ecosystems. Others think the state should avoid these fads and simply fund basic research. There is little agreement on how best to spur innovation. But most do agree on one thing: innovation matters for people’s living standards.

There are, fundamentally, three types of rich country. The first group is rich because of extractive industries. Norway, Kuwait, Saudi Arabia, and other countries have high incomes because they sell the hydrocarbons found in their lands and waters. It is easy to waste such assets, of course, and many countries have done so. But most countries don’t have the assets to squander in the first place. Having oil or natural gas reserves is a matter of luck, not judgment. Extractives are a viable route to prosperity only for a lucky few nations.
A second set of countries—such as Luxembourg, Ireland, and Singapore—has grown rich through what can be euphemistically called *openness*. These countries tend to be small financial hubs. They have skilled populations, locations next to large markets, and, often, very low taxes for international firms. A charitable interpretation of this strategy is that they are dynamic, open economies that attract global capital. A less charitable one is that they are tax havens. There is probably some truth to both characterizations. Competing on very low corporate taxes is, however, an option for only a few countries. Tax competition is a zero-sum game, a strategy that moves wealth around rather than making more of it. If all countries did it, there would be a race to the bottom, with states competing by reducing welfare standards and public services.

A third route to prosperity is innovation, or the development and application of new products and processes. Because natural resources are finite and tax havens are small, most rich countries have innovation at the heart of their economic model. If you plot their gross domestic product (GDP) per capita, a measure of national income, against research and development (R&D) intensity, a measure of the share of national income devoted to innovation, you find a strong relationship (see figure 1).\(^1\)

I’m not arguing that R&D is the only measure of innovation, nor that it is the best. Neither am I arguing that increasing R&D spending, or spending on any type of innovation, inevitably leads to economic growth.\(^2\) It is easy to waste money subsidizing pointless R&D. And I’m not saying that all countries fit perfectly into one of these three categories: some, such as Singapore, combine both innovation and free-trade models. But there is a huge body of academic work supporting the basic claim that innovation matters for economic development. Unless a country has oil or suspiciously low taxes, innovation is the best route to prosperity.

Most of the success stories of economic development—from the old world of the United Kingdom and France to later developers such as Taiwan and South Korea—have involved the identification,
production, and commercialization of new technologies. Policymakers know this. They use tax credits to subsidize R&D, fund expensive labs for blue-sky research that expands the frontiers of knowledge with no obvious application, and set out “missions” around which policy is supposed to focus. Innovation has become a central goal of most national governments.

But there is a problem with this strategy. High-tech innovation has revolutionized the world, but it has concentrated income and wealth in the hands of a few, polarized labor markets and led to divides between a small number of superstar cities and other regions. Inequality in advanced economies has been rising since the 1980s: the ratio of the income of the top 10 percent to that of the bottom 10 percent of earners across member nations of the Organisation for Economic Co-operation and Development (OECD) increased from 7:1 in 1980 to 9:1 in 2013. In the United States, between 1980 and
2017, the share of national income going to the lowest-income 50 percent fell from 20 percent to 12.5 percent. The 1 percent (of highest earners) have been the biggest winners, and their incomes have been increasing since the 1980s across the English-speaking world. Except in a few holdout nations, such as France, most of the advanced world has seen long-term growth in income inequality.

If the richest are gaining an increasing share of output, someone else must be losing theirs. Most of the evidence says that it is the middle classes (or, at least, middle-income earners) whose relative position has declined. The OECD investigated what happened to middle-income households, defined as those earning between 75 percent and 200 percent of median national income. Across the OECD, between the mid-1980s and mid-2010s, the share of households defined as “middle class” declined from 64 percent to 61 percent.

These macro-level problems hide a host of intersecting inequalities. Ethnic and racial inequalities have been prominent in public debate, for good reason. Racial inequalities in the United States are longstanding and stark. In the United Kingdom, the situation is different but little better, with people of Bangladeshi or Pakistani ethnicity having the lowest median household incomes of all ethnic groups. These inequalities are intersectional with other lines of distinction and discrimination. Most notably, gender wage gaps are pervasive across the “advanced” world and have changed depressingly little. Women earn less than men, even when performing the same jobs. Even where you live matters. Evidence shows that growing up in a deprived neighborhood or town can have a long-term impact on your living standards, even if you move elsewhere.

These inequalities—and many others that are less visible and less well reported—have significant social, economic, and political consequences. If people feel their life chances are predetermined by parental income, class, gender, ethnicity, or where they live, it is hardly surprising that they may vote for populist parties that claim to offer simple solutions for these entrenched social problems. They
are less likely to trust national governments, vote, or participate in civic life. And they are more likely to become rent seekers, increasing their own income at the expense of others, rather than collaborating and building the social structures necessary for a functioning economy. As a result, inequality can threaten economic success.

Yet many of the world’s most important hubs of innovation, from Shenzhen to Seoul, are characterized by high levels of inequality. San Jose, California, the home of Silicon Valley, is one of the most unequal metropolitan areas in the United States. There is a clear link between employment in high-tech sectors and localized inequality. Oxford and Cambridge are two of the most unequal places in the United Kingdom, despite their success in innovation. The new products and processes created in these cities are producing real economic gains, but those gains are not shared among all residents.

The fact that innovation is vital for economic success but often linked to gross inequality is a challenge for policy and society. But growing inequality is a general trend, not a universal law. There are significant national and regional differences in both the magnitude of increases in inequality and their patterns. For example, while the income share of the top 1 percent of earners has increased in the English-speaking countries since the 1980s, it has remained flat in much of continental Europe. Growth since 1980 hasn’t benefited those with below-median incomes in the United States, but in Western Europe the poorest 50 percent have seen their incomes rise by 40 percent (in contrast to a 3 percent increase in the United States). The United States is richer than Europe, but the bottom 50 percent of the population earns around 15 percent less than the equivalent group in Western and Northern Europe.

Such divergent trends are difficult to reconcile with the conventional explanations for inequality, which center on the differential impact of technology on workers depending on their particular skills, and the pervasive impact of trade with less advanced economies. The universal pressures caused by technology and globalization do not play out the same way in all countries. National
institutions and policy choices matter in moderating the effects of these changes. Plenty of prosperous economies have managed to grow without succumbing to the high levels of inequality of the English-speaking world.

LOOKING BEYOND SILICON VALLEY

When policymakers aim to boost innovation, they search for models from the most innovative places—and from one, Silicon Valley, in particular. Countries from Saudi Arabia to Vietnam have attempted to emulate its success by building business parks in deserts, setting up state-backed venture capital funds to support disruptive innovators, and investing in high-risk innovation agencies. A cliché of Silicon Valley has inspired countries all over the world to develop their own Silicon-Somethings, from Kenya’s Silicon Savannah to the United Kingdom’s Silicon Canal (Wikipedia lists eighty-one examples). Innovations from the San Francisco Bay Area have shaped the world, from Google’s search engine to social media platforms such as Twitter. The Silicon Valley model of innovation policy is itself one of these, and it has gone viral.

Yet for all its success, the Silicon Valley model of innovation is highly problematic. The Bay Area is home to many important tech startups, but there are homeless encampments on its streets. The United States may be the home of more tech unicorns (privately held startup companies valued at over US$1 billion) than any other country, but its life expectancy has been falling. GDP has grown, but the middle classes have declined. The most successful startup founders have made billions, but real wages for the least well-off Americans have not increased since 1979. Some scholars have argued that Silicon Valley has concentrated investment in superstar cities, locking in regional inequalities.

Other examples are similarly troubling. South Korea has become one of the world’s leading producers of advanced technologies such
as smartphones, but it struggles with stagnant wages and gross inequality (if you doubt this, watch some of its most famous media exports: *Parasite, Squid Game*, and even “Gangnam Style”). The capital city, Seoul, dominates the economy so much that the government is pushing for more balanced national growth. The UK model—less innovative, but still important for policymakers internationally—has strengths in higher education, but spinouts from Oxford and Cambridge concentrate the benefits in already affluent parts of the country, while high house prices squeeze the real wages of those who live there.

The Silicon Valley model of radical innovation, startups, and elite, exclusive universities does not lead to broadly shared prosperity. This problem has been noted in the classic texts about Silicon Valley. In one of these, UC Berkeley’s Annalee Saxenian highlights the problems of less-well-paid workers in factories who were being priced out of affluent areas. Two Bennett Harrison has argued that the widespread view of Silicon Valley as a center of global tech often ignores problems of inequality and disadvantage. Yet researchers and policymakers have too often assumed that this inequality is inevitable. Focusing on Silicon Valley alone has led us to conclude that a truly innovative economy comes at the price of high inequality.

Innovation policy is fixated on the basic question of how to increase innovation. The answers matter, of course, and should provide a foundation for policy. Yet there is no point being “one of the most innovative countries on earth,” “a leader in the fourth industrial revolution,” “winning the global race for innovation”—or whatever hyperbole is currently in fashion—unless innovation translates into broadly shared prosperity. The US model, despite its great strengths, is problematic: the true purpose of technological leadership is not to win Nobel prizes or develop the most disruptive technology but to increase living standards. Policy for innovation should aim to create good jobs and ensure prosperity is widely shared. Innovation itself is vital but only half the answer.
While there are many studies on innovation and inequality, most of these are attempts to look at where one leads to the other, whether by considering the impact of technological change on labor markets or by studying the divided labor markets of high-tech hubs. In this book, instead of looking at cases where innovation drives inequality, I focus on places where it is a more positive force: where innovation leads to widely shared prosperity.

My approach challenges the conclusion of US studies showing that innovation inevitably results in high levels of inequality. My core argument is that, too often, innovation policymakers ask the wrong question and then look for answers in the wrong places. In addressing the question of how to increase innovation, they focus on models from places such as Silicon Valley, drawing up shopping lists of policies that are then haphazardly transplanted to other parts of the world. It is hardly surprising that these policies fail so often to increase the welfare of people in the national and local economies in which they are applied.

**GOOD INEQUALITY, BAD INEQUALITY**

There are good reasons to see inequality as a bad thing. Basic ethics suggests that inequality is undesirable, and a simple utilitarian principle is that the least well-off gain more value from a marginal increase in income than someone whose needs have already been met. But things are more complex when considering the link between innovation and inequality, as it might be the case that innovation leads to inequality but still benefits society. A new technology—for example, a lifesaving vaccine—might make someone rich, but others gain from the vaccine’s existence as well. Moreover, in the long term many people might be able to build on this initial innovation, leading to more widely distributed benefits. In this case, innovation begets inequality, but it is not clear that inequality is necessarily a problem. The Industrial Revolution led to a major increase in inequality, as some parts of
Britain rapidly grew rich, but other places followed in time. Where it provides the incentive for behavior that increases living standards for others, inequality can be justifiable. With tongue in cheek, I’m going to call this sort of reward for risk taking “good inequality.”

The problem is that “good inequality” too often leads to “bad inequality.” We know that income inequality is associated with inequality of opportunity, as those who have higher incomes pull up the ladder and foreclose opportunities for those who have less, and social structures become more rigid. For example, faced with competition for jobs, employers may start to demand expensive graduate degrees that are out of reach of intelligent students from low-income households. We can see similar processes at work in the economy if innovative firms can use their success to restrict the gains of others. In some tech industries, for instance, firms gain a first-mover advantage and then build strategic “moats” that stop others from gaining market share and competing with them. Worse, these firms may maintain their market share through anticompetitive practices or the strategic use of lawsuits. The unequal rewards of innovation can, in such cases, reduce innovation in the long term.

A second challenge to this view is that the gains from innovation rarely derive from one firm or worker alone. Innovation tends to be the result of effort by a range of actors in both the public and the private sectors who provide the infrastructure and knowledge on which innovative firms build. While some inequality might be the result of just rewards for the risk and talent required to commercialize these activities, the gains need to be shared.

It is helpful to think clearly about when inequality is and isn’t acceptable and what should be the goal of public policy. There is a clear rationale for ensuring that the benefits of innovation are shared within the firm, industry, or city in which it occurs. There is also a strong justification for offering incentives to those who introduce innovations, provided these incentives do not become distortions.

In this book, I consider the innovation-inequality link in several different ways. First, I consider aggregate measures of inequality,
such as the Gini coefficient, which characterizes a nation's income distribution on a scale between 0 (perfectly equal) and 1 (perfectly unequal). This measure is useful but partial, as it doesn’t tell us much about what is happening within the distribution. Another measure is related: the share of income going to the bottom 40 percent of the population. It is probably better to be less well off but surrounded by the rich than in uniform poverty (although it is better yet to be rich and equal). There’s a question about the extent to which we would tolerate the development of elites if it came with higher living standards for the rest of the population, a question that can only be answered on a case-by-case basis. I try to draw out the distinction between good inequality—temporary rewards for genius, risk taking, or hard work—from the bad inequality that can result. I also focus on wages and job creation, with a particular focus on income for the “middle classes” (although these are quite problematic to define). The extent to which inequality is tolerable if everyone’s incomes are increasing is a more challenging question.

INNOVATION AND EQUITY: FOUR CLUBS

Which countries manage to combine innovation with broadly shared prosperity? It is hard to answer this question. Innovation is hard to define statistically. Common measures, such as R&D spending or number of patents, give only a partial reflection of innovation. They give no indication of the significance of innovation, and they fail to represent many innovative parts of the economy.

Shared prosperity (or, its inverse, inequality) is equally hard to define. A higher Gini coefficient indicates greater inequality. Yet underlying this simple measure are a host of complexities. Should income be measured before or after tax? Should it be considered as individual or household income, and how should children be taken into account? How should we treat inequality between
different genders or ethnic groups? A single aggregate measure can hide significant variation within the income distribution.

I consider these complications in more detail in chapters 2 and 3. The clearest test of the innovation–equality trade-off is given in figure 2, which presents two simple scatter plots of several countries, with different measures of inequality on the horizontal axis, and patenting per capita on the vertical axes. The plots effectively divide the nations into four clubs. In the left-hand plot, at the top left are countries with high innovation and low inequality—countries where the proceeds of an innovation-led economic model are, broadly, shared. In the right-hand plot, where innovation is plotted against
the bottom 40 percent share of pretax income, the club of equal and innovative countries appears at the top right.

The first conclusion from these plots is obvious: there is no clear relationship between innovation and equality. Innovation does not come at the cost of inequality; nor does high inequality necessarily spur innovation. The East Asian economies are highly innovative, at least according to the measures shown, but also highly unequal. The United States is in the same category. Canada and the United Kingdom are closer to the average.

But there is a club of countries that combine innovation with equality. These include Finland, Sweden, Denmark, Switzerland, Austria, and Germany. Even Belgium, traditionally overlooked, has relatively low inequality and relatively high innovation by this measure.

But in this book I focus on those in another club: nations that are highly innovative, but where the benefits are shared more equitably. How do these countries achieve this outcome? This is a difficult question to answer, in part because innovation policy tends not to be directly focused on improving living standards, but also because policies that lead to innovation and those that ensure it is broadly shared are often developed and implemented in parallel, with little coordination.

MY ARGUMENTS

In this book I make three arguments, each of which I support with theory, empirical literature, data analysis, and case studies of countries that achieve this balance in very different ways.

First, the dominance of Silicon Valley and, increasingly, China, obscures models that are better at linking innovation with shared prosperity. Europe is too often either dismissed because of the poor performance of southern Europe in the early 2010s or because the
focus is on Germany or clichés about the Nordic nations. Yet other European countries have been highly successful at innovation. Switzerland is regularly ranked the most innovative country on earth, and its inequality is below the OECD average. Austria has seen the fastest growth in R&D of any OECD economy bar South Korea and has a strong record of creating skilled, middle-class jobs. And Sweden has long been an economic poster child, combining entrepreneurship and high median wages with a strong welfare state. These countries present important lessons for policymakers in other countries, yet they have too often been ignored in favor of other models.

Second, the state plays a vital role in distributing the benefits of innovation-led growth. Despite rhetoric about a global playing field, national and local context still matters hugely for the development of innovation systems and how those systems affect living standards. The states listed above have succeeded by maintaining and developing their own local models. Innovation policy should be considered not in isolation but with reference to the wider policy frameworks ensuring that workers benefit—including education and training policy, housing, and welfare policy. The state plays a role both in spurring innovation and in ensuring that the benefits are shared. It manages education and training, providing a cushion that allows entrepreneurs to fail, establishing a policy framework that can help ensure the innovation economy is inclusive, and so on. The role of the state goes far beyond funding basic R&D. It also goes beyond providing a strong welfare state. In many of the countries I studied, state actors had, intentionally or not, aligned policy in a way that that gave workers the ability to gain from, adapt to, and shape the nature of innovation. They had also helped provide institutions that facilitated diffusion of frontier knowledge through the economy.

Third, policies for innovation and broadly shared prosperity are mutually reinforcing. Policies that enable broader participation in
the innovation economy provide an important comparative advantage. High-quality public services in Switzerland and Sweden attract skilled international science, technology, engineering, and mathematics (STEM) employees who contribute to the economy. The Austrian skill system creates highly productive mid-skill workers, and Austrian firms restructure production processes to create jobs for these workers. Taiwan balances skill development with innovation-led growth strategies. Each of these is an example of the coevolution of state and economy.

Building on these arguments, I argue that three sets of institutions are at work in these countries. The first are institutions that generate innovation. Much of the academic and policy literature has focused on the development of these institutions—with good reason, as they are crucial to the success of advanced economies. A second set of institutions—those that allow diffusion, adaptation, and increased access to innovation—is more important in ensuring that the benefits are broadly shared. These include applied research organizations, networks of small firms, and skill structures focused on diffusion of new technologies. Such institutions focus on incremental innovation and adaptation rather than radical new technologies. A final set of institutions focuses on redistribution and basic public service delivery. Given the tendency of innovation in many leading-edge sectors to concentrate wealth, these institutions remain important.

The immediate challenge to these arguments is likely to be an objection to the idea that policies which are successful (or otherwise) in one place can be packaged up and reused in a very different context. This idea, sometimes called fast policy, is a real concern for anyone doing comparative work. Policymakers, desperate for success in a difficult world, may rely on superficial learning from other countries, with “prefabricated” solutions that are decontextualized—in that they are not necessarily appropriate in other geographies—and depoliticized—in that their proponents downplay the need for hard choices or trade-offs. Yet such problems of fast policy are
exactly what this book is trying to address. The emulation of Silicon Valley I outline above is fast policy. Instead we need a deeper understanding of the systems in which certain policy measures succeed or fail.

A second challenge is that these outcomes are simply about the welfare state. One variation of this argument is that the only solution to inequality is redistribution and a larger state. Yet while redistribution matters hugely, it can only ever provide a partial explanation for the income distribution. General government spending is just under half of GDP in Sweden and Austria, but in Switzerland it is only 33 percent, less than in the United States (39 percent).\textsuperscript{15} (Figures for Taiwan are unavailable.) While redistribution is important, increasing taxation is not the only way to deal with inequality. According to estimates by Thomas Blanchet, Lucas Chancel and Amory Gethin, the lion’s share of the difference in posttax inequality levels between the United States and Europe can be explained by the pretax distribution.\textsuperscript{16} To put it another way, the income distribution is already largely determined by institutional frameworks, the skill distribution of the population, and other factors. Redistribution is vital, but its importance is also a symptom of something going wrong elsewhere. If the right institutions are put in place, redistribution becomes less necessary. Innovation allows growth, which allows redistribution and so reduces inequality. This is partly true: Sweden and Austria have high levels of redistribution. But it is not the case in Switzerland, which has the third \textit{lowest} difference between pre- and posttax inequality in the OECD.

This book is about realism. It is not about clichés of Nordic perfection nor breathless hype about digital technology. Austria’s persistent gender gaps are shameful, Swedish populism is embarrassing, and the neutrality of the Swiss model has a dark side. These are countries, not football teams, and I’m not going to pretend that they are perfect. But if we were looking for a perfect country, a perfect model, or a perfect policy idea, we would be looking for a long time. Instead, we need to learn from the real world.